

Winter Storms

**National Weather Service
Baltimore/Washington Forecast Office**



Filling Out Your Registration Form

The information you enter on this form **WILL NOT** be given out to anyone. You are protected by Federal Privacy Laws.

Spotter numbers are sent out via email. Please write legibly! If we can't read your email address, you might not get your number. Also, check your spam folder settings. The email will come from @noaa.gov

****Please give us 3-4 weeks to input your information and get you a Spotter ID. You can still call/email us during that time****

**NWS Baltimore/Washington DC
SKYWARN Registration Form**
(Please Print)

Name: _____ Date: _____
Course/Location: _____ Instructor: _____

Have you taken Basic I SKYWARN training before? Yes _____ No _____
When? _____ Where? _____
Spotter ID Number? _____

Ham Call Sign: _____

Email Address: _____
Secondary Email Address: _____

**If you are a new spotter OR need to update your information, please
fill out the portion below.**

Street Address: _____
City: _____ State: _____ Zip: _____
County (or Independent City-VA): _____

Home Phone (with area code): _____
Work Phone (with area code): _____
Cell Phone (with area code): _____

May we call you if Hazardous Weather Occurs? Yes _____ No _____
Unavailable times (i.e. 10PM-6AM): _____

Do you live near a stream or river? Yes _____ No _____
If yes, what is its name? _____

Do you have any of the following equipment?
Rain gauge? Yes _____ No _____ Thermometer? Yes _____ No _____
Anemometer? Yes _____ No _____ Weather Radio? Yes _____ No _____

Today's Topics

- Reporting Procedures
- Measuring Snowfall
- Winter Storm Ingredients
- Winter Hazards
- Preparedness & Safety
- NWS Products & Services
- 2009-2010 Case Studies



Reporting Criteria for Winter Storms



- **Ice Accumulation**
Any glaze on surfaces



Not a real dog!



- **Snow Accumulation**
Every 2 inches, or any accumulation not reflected in the forecast

Snowfall Reporting & Measurement

- **Ruler**
- **Snowfall**
 - **First two inches**
 - **Every two inches or so**
 - **TOTAL SNOWFALL**
 - **Is it measured or estimated?**
- **Ice Accumulation – any!**
 - **Surface its accumulating on**
 - **Thickness**



22 inches

Snowfall Reporting & Measurement



Ideally, a snowboard is the best measuring surface.

- Can be as simple as a 2 ft square piece of plywood painted white
- May want to place flags/markers near the board to help locate during snowy weather

Snowfall Reporting & Measurement

You can also measure snow on an outdoor table.

If drifting is a problem, then take several measurements and take an average!



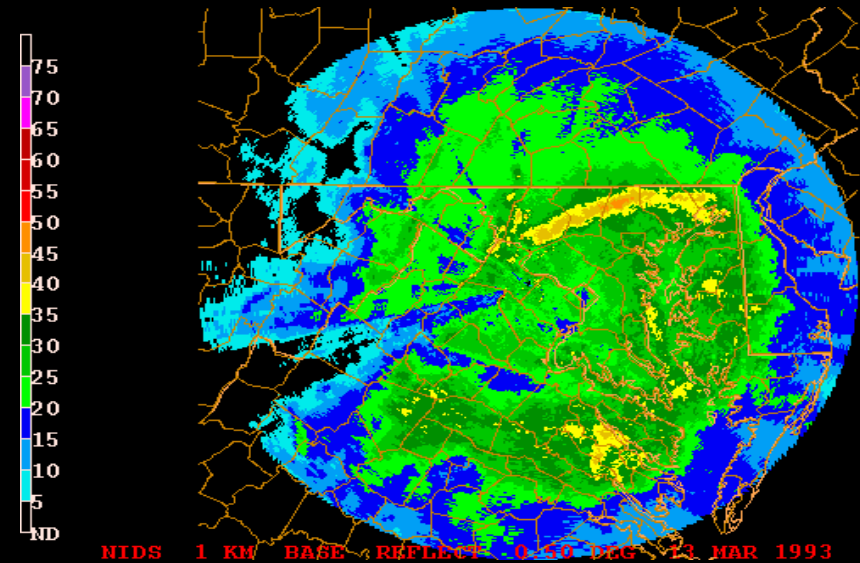
Frequency of Measurements:

- Every two to three hours is adequate
- Please report your **STORM TOTAL** snowfall to the nearest tenth of an inch after the event is over.
- You should clean off snowboards every **six hours**
- **Cleaning more often can lead to inaccurate snowfall measurements**
- phone
- email

Snowfall Reporting & Measurement

- **Changing Precipitation types**
 - Call in when a significant change has occurred, especially if not reflected in the current forecast

Dual Pol radar will help us better understand winter precipitation types.



Radar image of March 1993 Storm

What type of precipitation is falling from the bright yellow band across central and northern Maryland? Heavy snow, sleet, or rain? The radar can't tell.

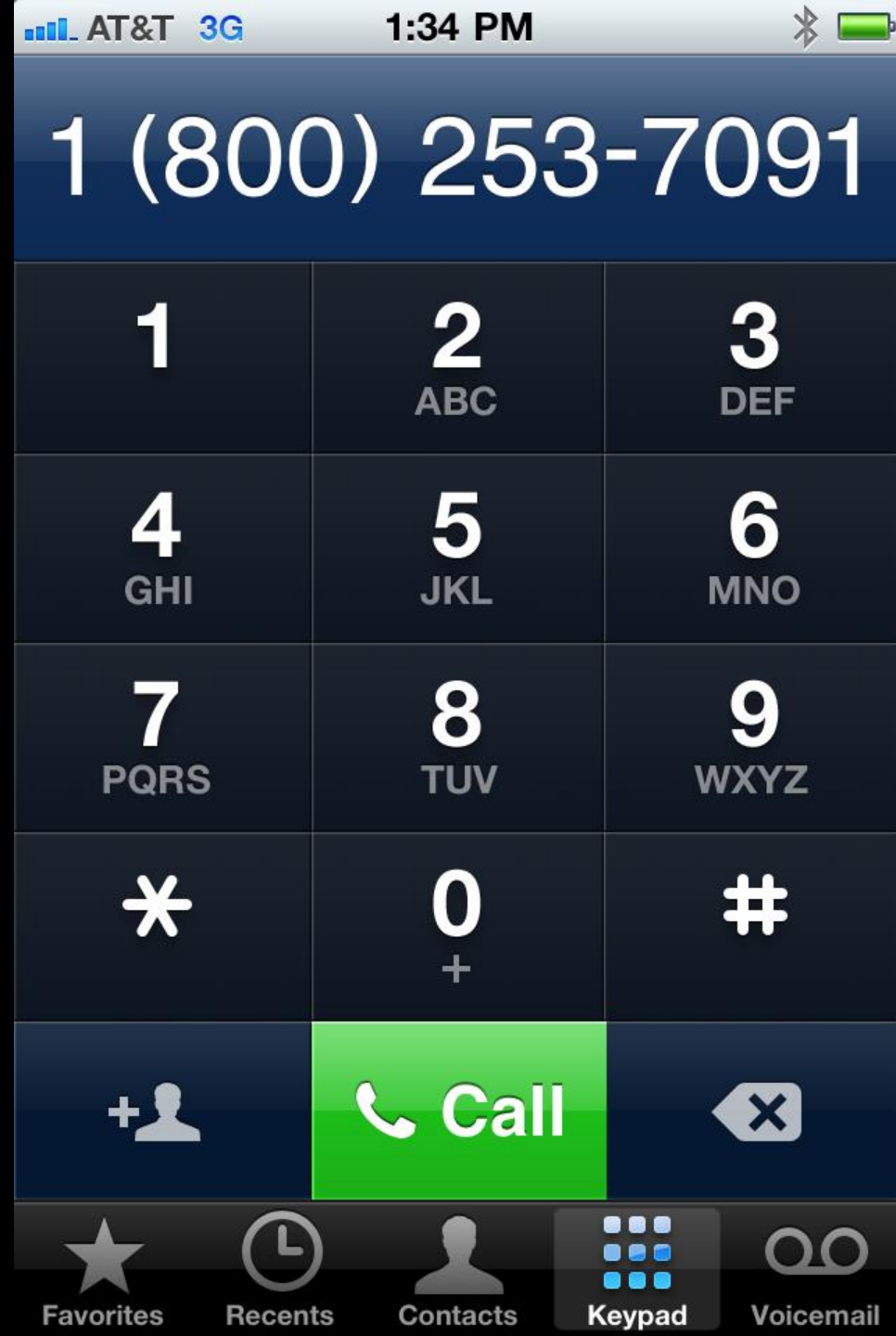
How to Report Information

1. Call NWS Sterling directly if weather is imminent:
(800) 253-7091 or (703)996-2200
2. You can email your reports to:
lwz-report@noaa.gov
2. Contact local Emergency Management
3. Amateur Radio (when activated)

**If your report is severe thunderstorm
hail/wind/tornado or flooding related, please
DO NOT send your report by email!**



Let's take a minute to enter the phone number into your cell phone...



Mid-Atlantic Winters

Temps.	Nov.	Dec.	Jan.	Feb.	Mar.
Max.	56.4	45.3	41.4	44.9	53.6
Min.	36.5	28.1	24.4	26.6	33.5

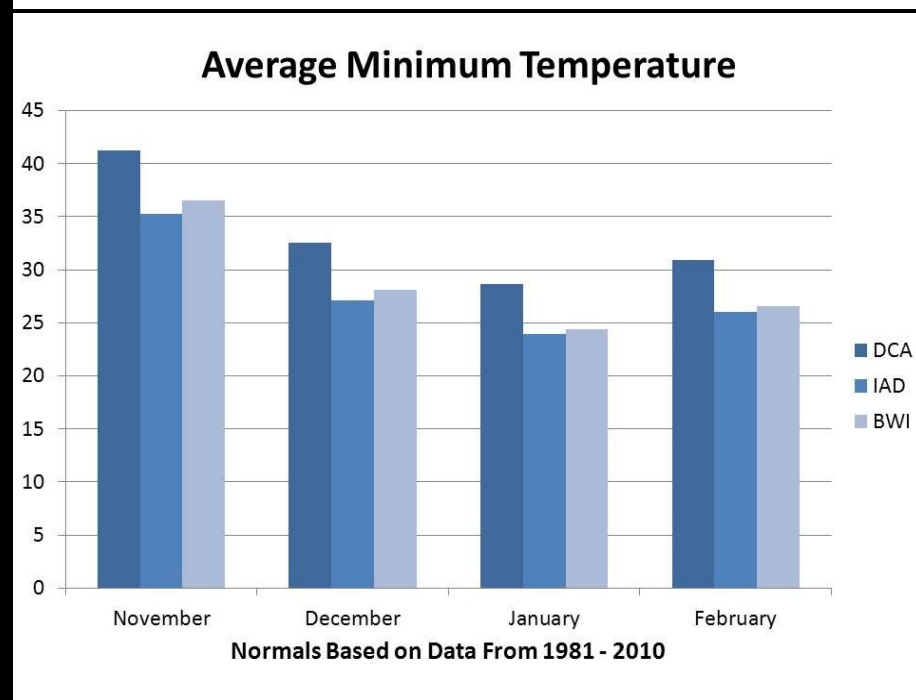
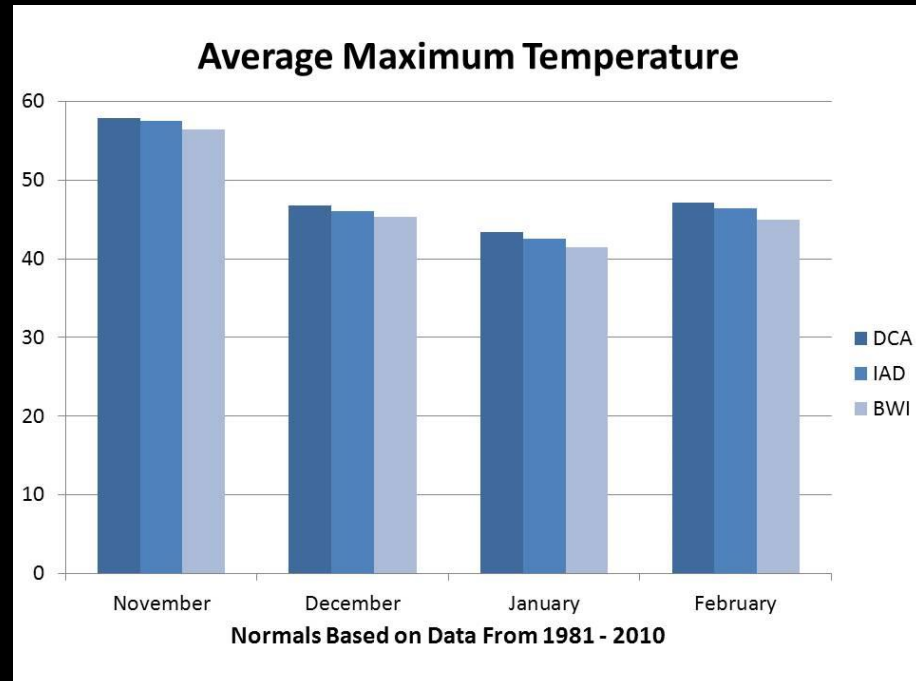
Normals based on BWI data from 1981-2010

Snowfall	DCA	IAD	BWI
October	Trace	Trace	Trace
November	0.5	0.5	0.4
December	2.3	3.5	3.0
January	5.6	7.3	6.8
February	5.7	7.6	8.0
March	1.3	2.8	1.9
April	Trace	0.3	Trace
Season	15.4	22.0	20.1

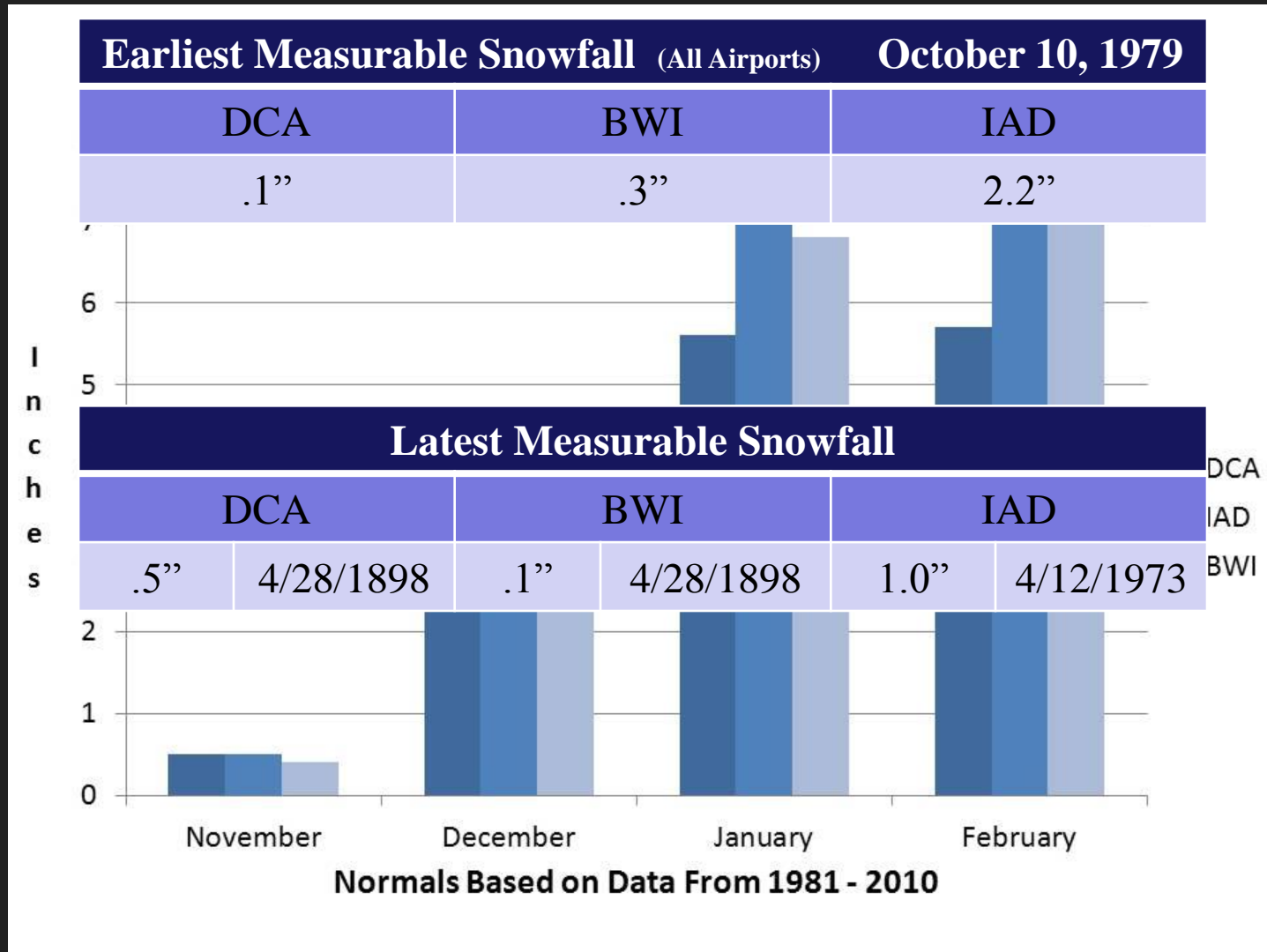
Normals based on data from 1981-2010

Mid Atlantic Winters

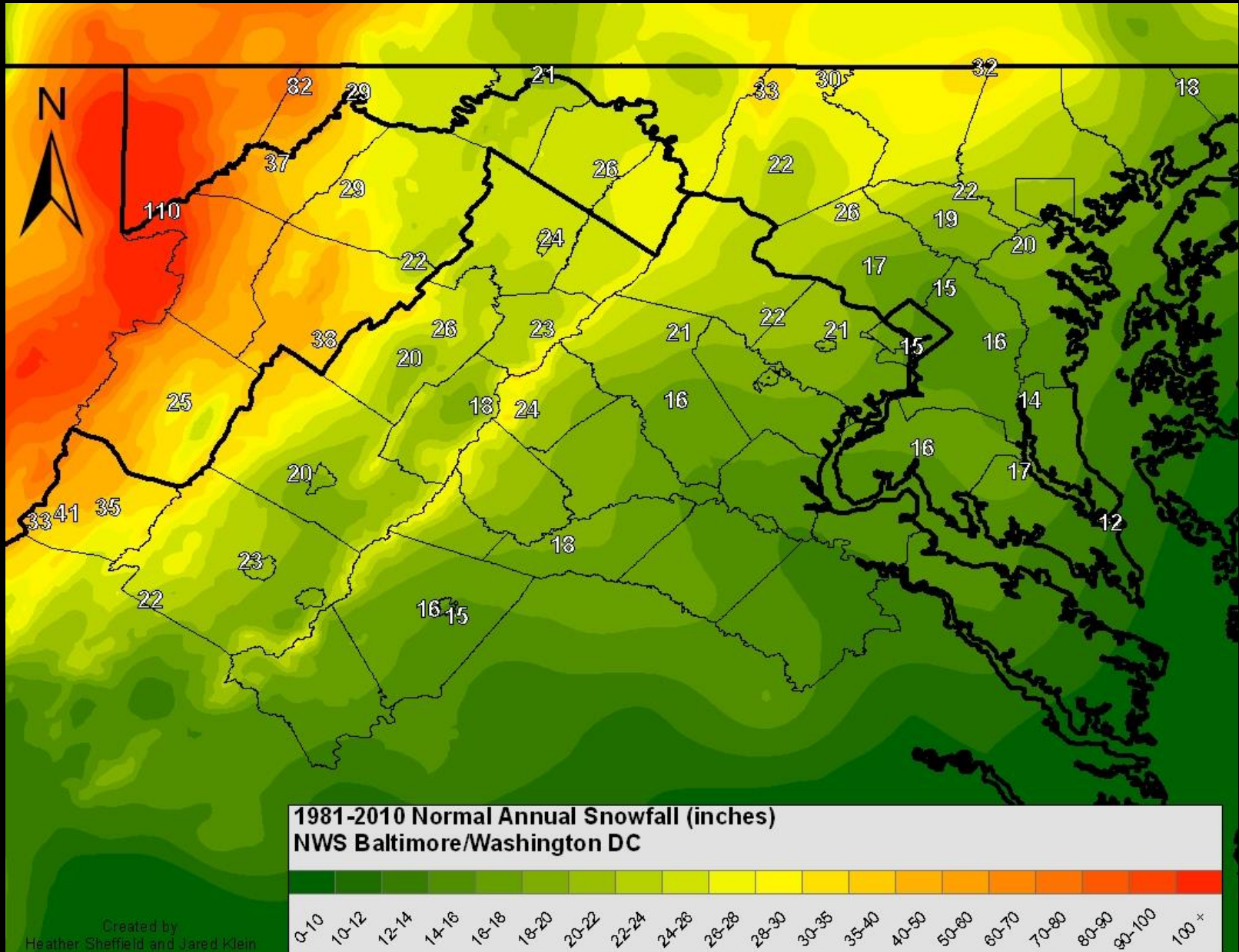
(Normal Temperatures)



Mid Atlantic Winters



Average Annual Mid Atlantic Snowfall Map



Mid Atlantic Winters

Snowiest Month Ever					
DCA		BWI		IAD	
35.2"	2/1899	50.0"	2/2010	46.1"	2/2010



FEB 1899 Washington DC
Photo Courtesy: Washington Post



6 Miles SW of IAD
Photo: Listemaa



Downtown Baltimore
FEB 2010



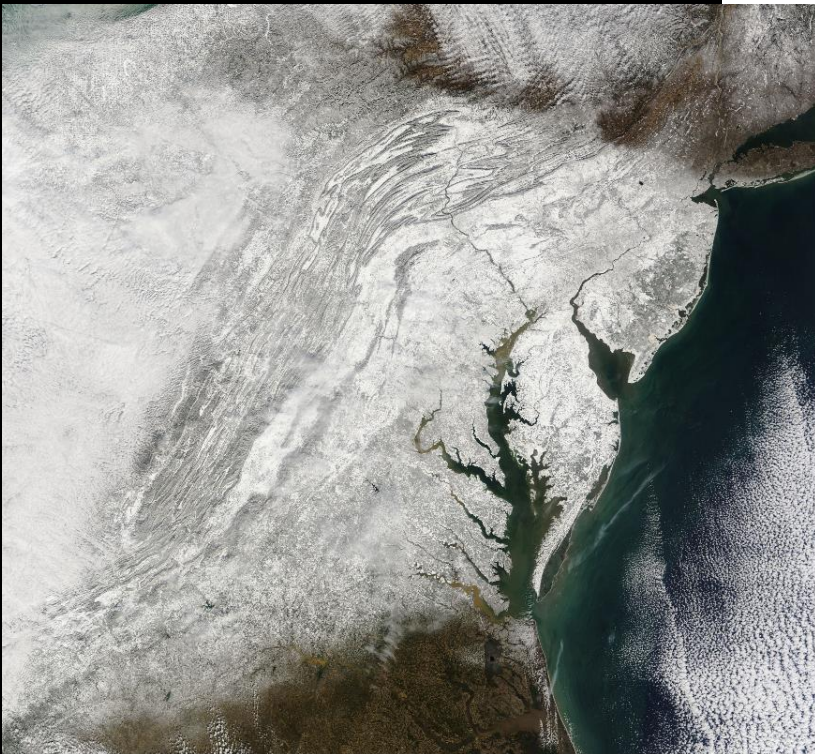
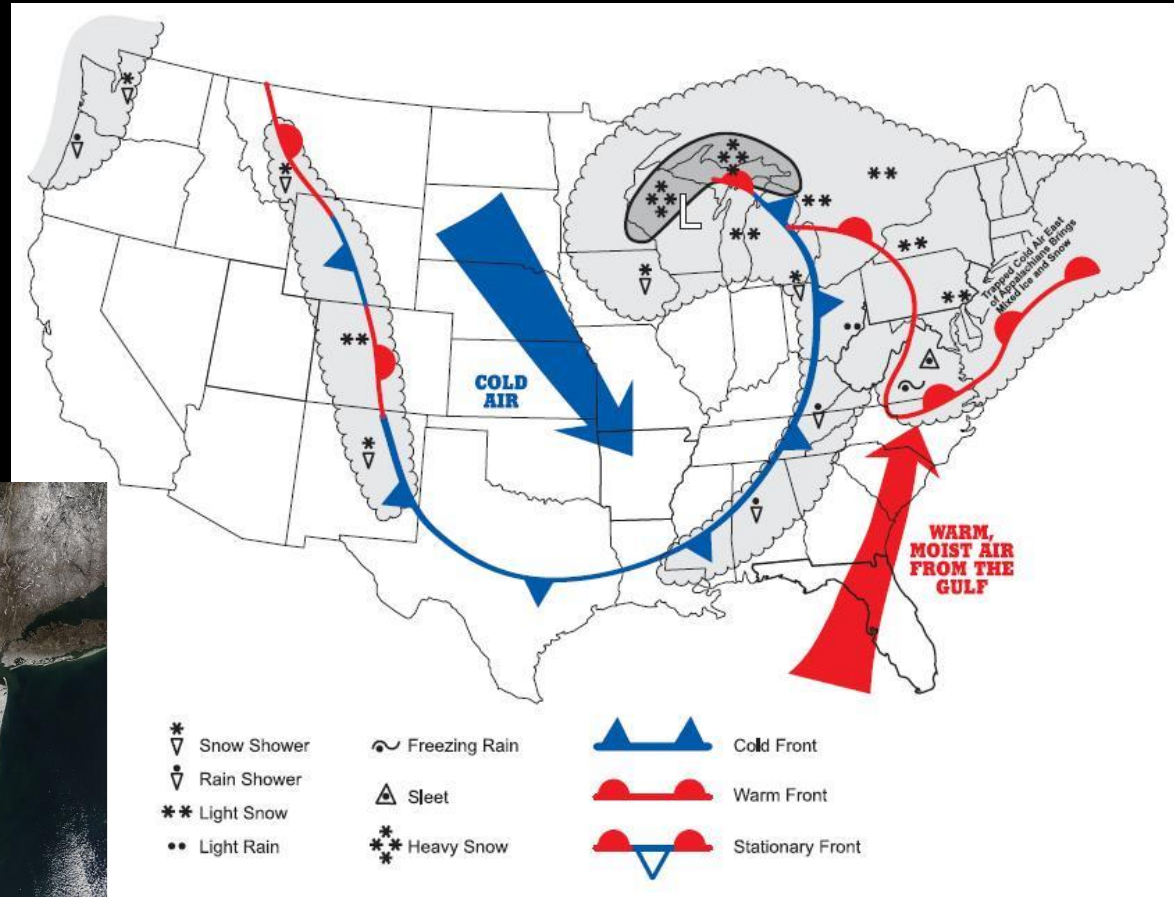
Fells Point, MD
Photo By: faithdesired.com (Flickr)
FEB 2010

Precipitation Extremes

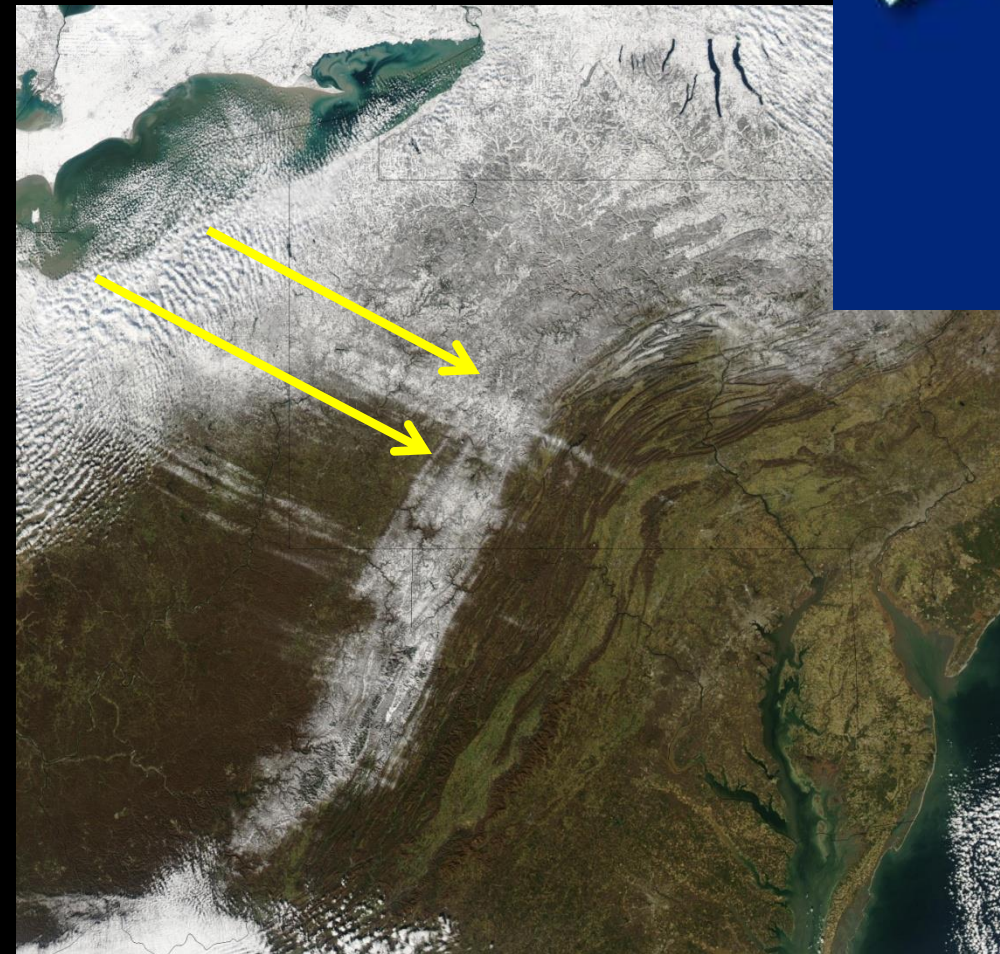
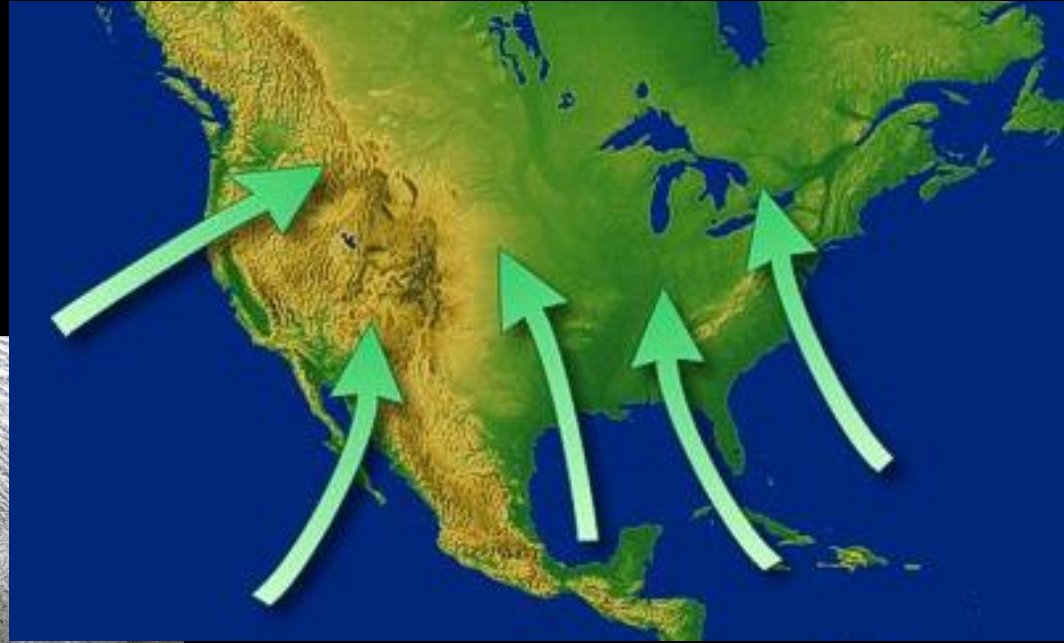
	Washington D.C. (1884-2010)		Baltimore, MD (1892-2010)		Dulles, VA (1962-2010)	
	1-3 Day Total	Date	1-3 Day Total	Date	1-3 Day Total	Date
1)	28.0	Jan 27-29, 1922	26.8	Feb 16-18, 2003	32.4	Feb 5-6, 2010
2)	20.0	Feb 12-14, 1899	26.6	Jan 7-9, 1996	24.6	Jan 6-8, 1996
3)	18.7	Feb 18-19, 1979	26.5	Jan 27-29, 1922	22.8	Feb 10-11, 1983
4)	17.8	Feb 5-6, 2010	25.0	Feb 5-6, 2010	21.7	Feb 15-17, 2003
5)	17.3	Jan 7-9, 1996	22.8	Feb 11, 1983	18.0	Dec 18-19, 2009
6)	16.6	Feb 10-11, 1983	22.0	Mar 28-29, 1942	16.3	Feb 18-19, 1979
7)	16.4	Dec 18-19, 2009	21.3	Feb 12-14, 1899	15.4	Dec 30, 1970-Jan 1, 1971
8)	16.4	Feb 16-18, 2003	20.0	Feb 18-19, 1979	14.1	Mar 13-14, 1993
9)	14.4	Feb 15-16, 1958	19.5	Feb 9-10, 2010	12.1	Dec 25-26, 1969
10)	14.4	Feb 7, 1936	18.0	Dec 18-19, 2009	12.0	Feb 22-23, 1987

Ingredients for a Winter Storm

- Cold Air
- Moisture
- Lift



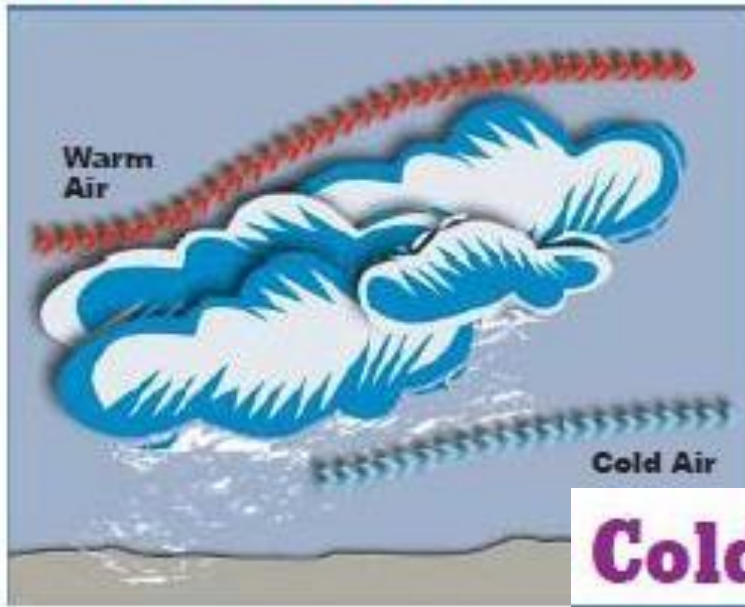
Sources of Moisture



Our moisture sources are the Great Lakes, Atlantic Ocean/Gulf Stream, and the Gulf of Mexico.

Sources of Lift

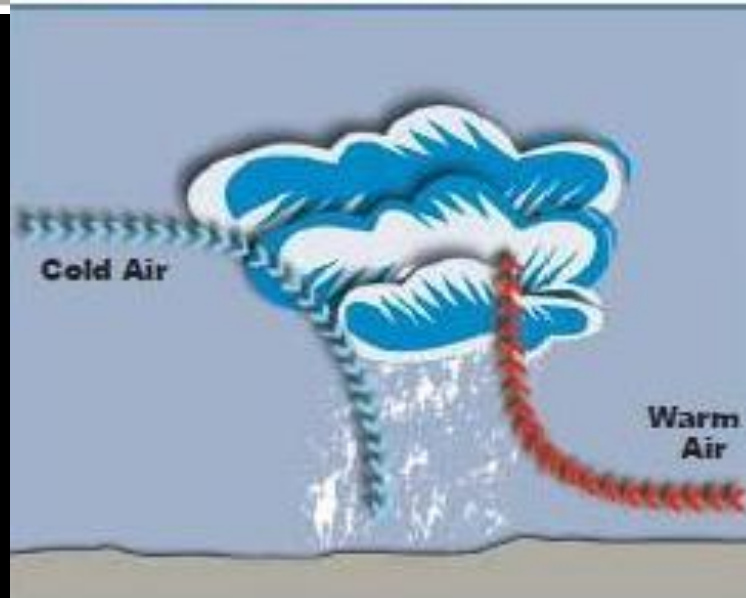
Warm Front



Mountain Effect

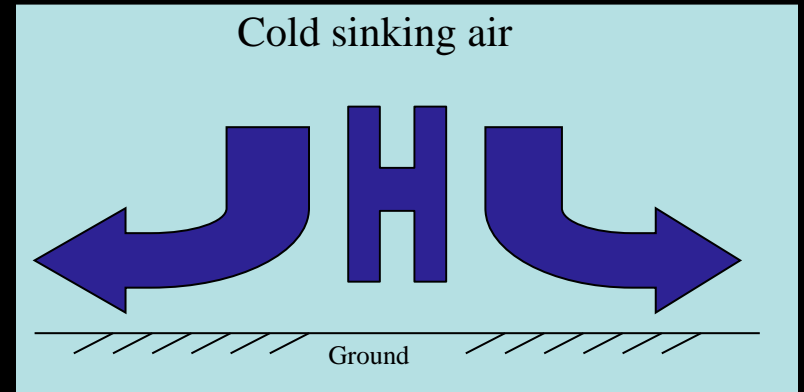


Cold Front



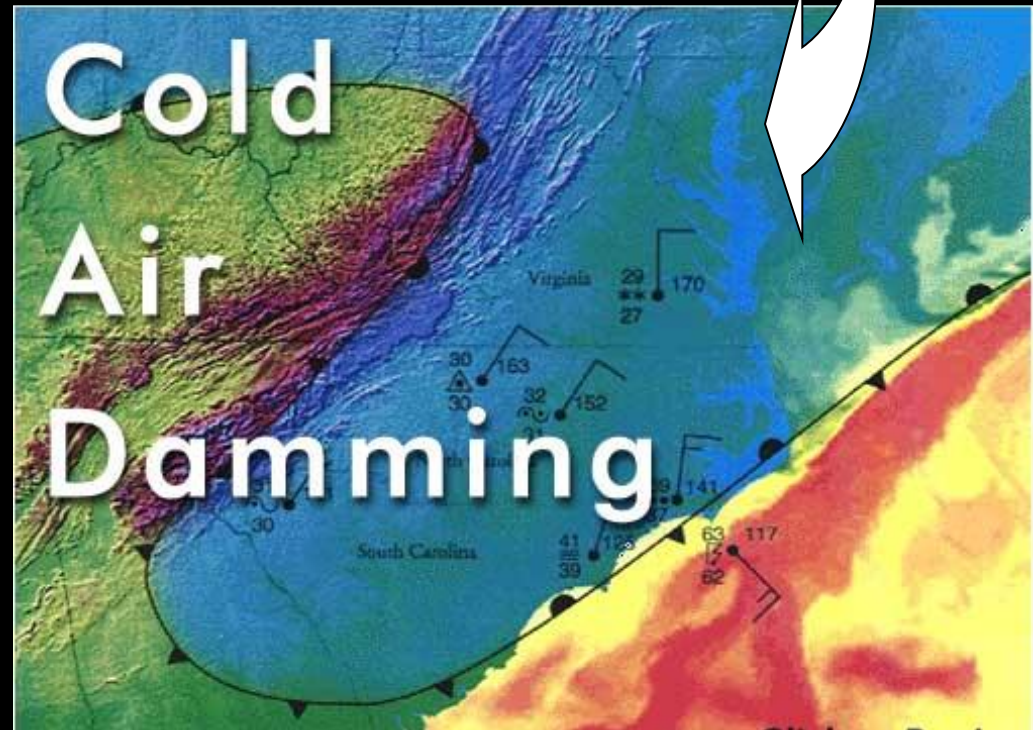
Sources of Cold Air

- Arctic
- High Pressure

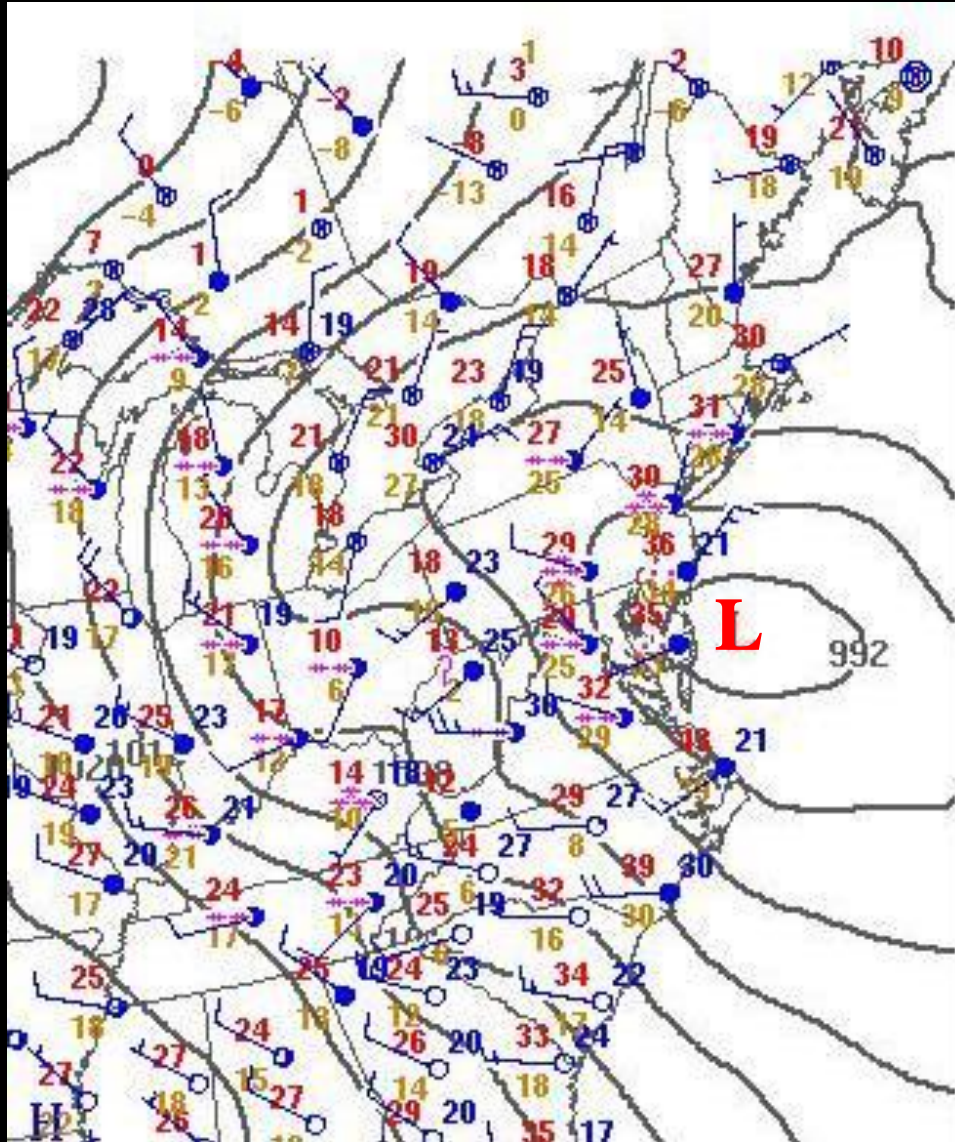


Cold Air Damming

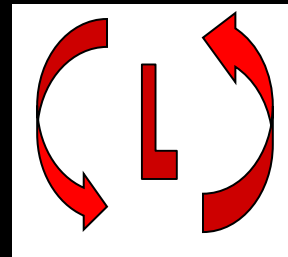
- Cold stable air can not move over mountains



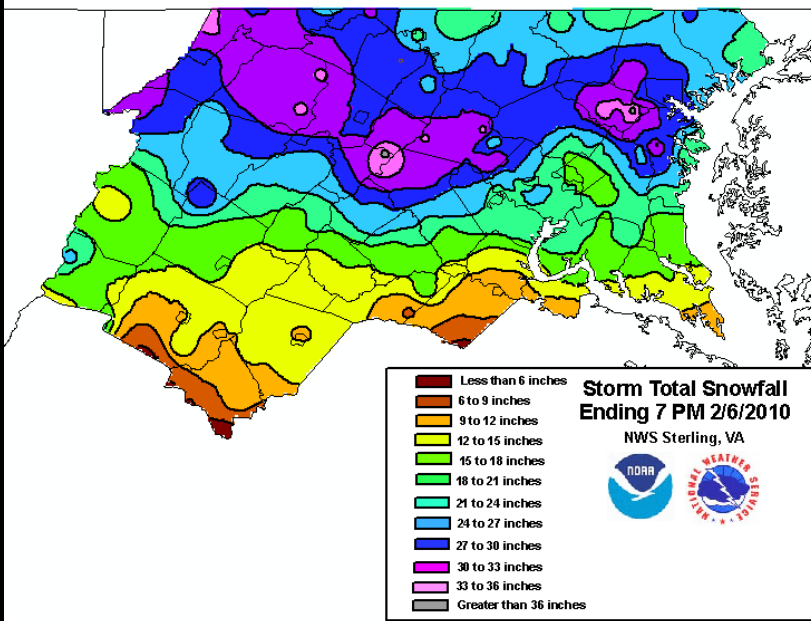
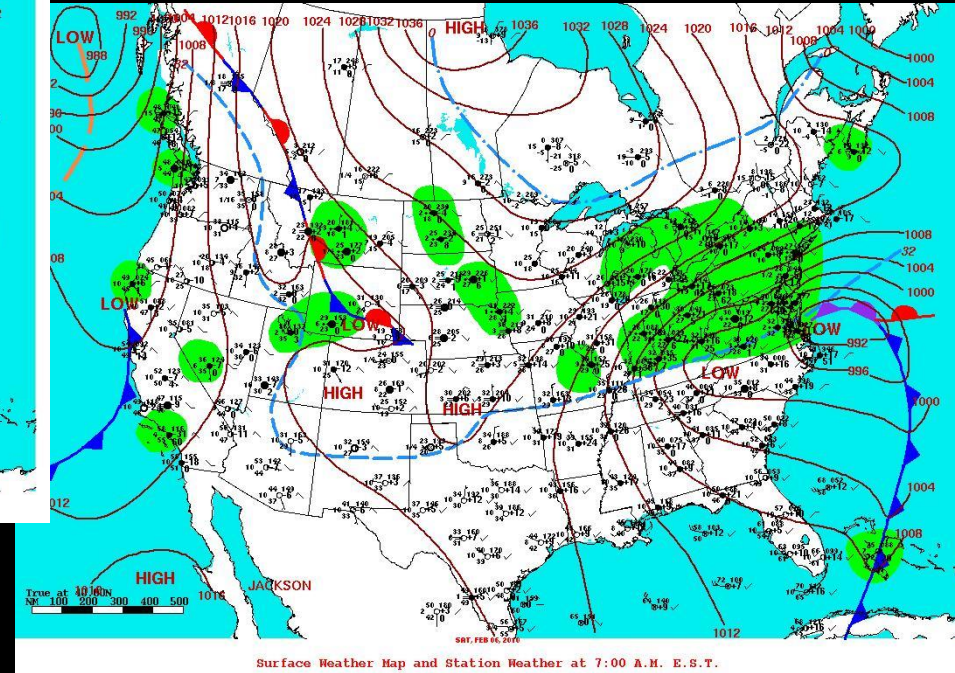
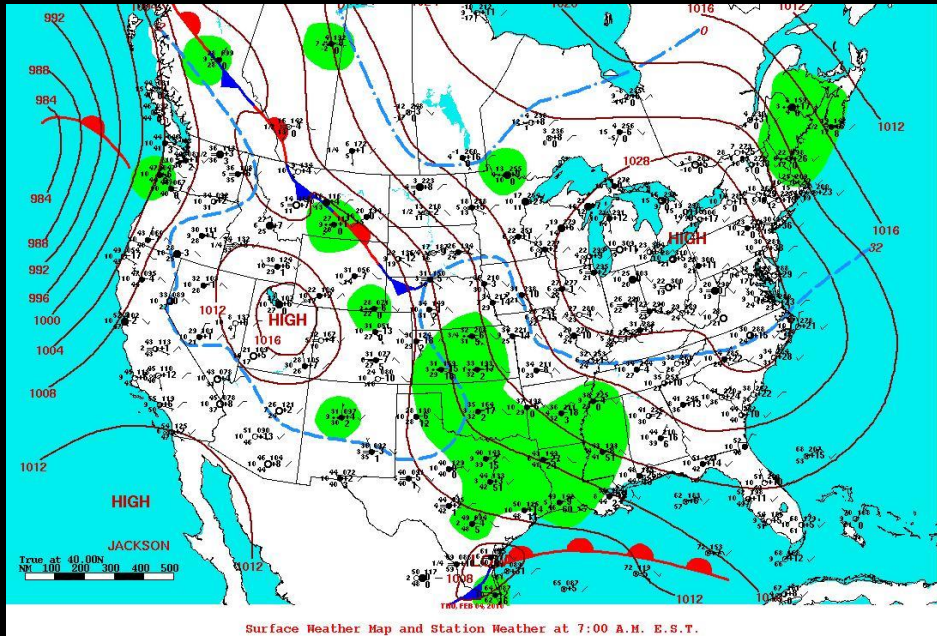
Best Combination



- Coastal Lows / Nor'easters
- Low center acts as a source of lift
- Moisture comes from warm Gulf Stream
- Wind circulating around the low, lifts the warm moist air up over the cold air locked over the coastal plain east of the mountains

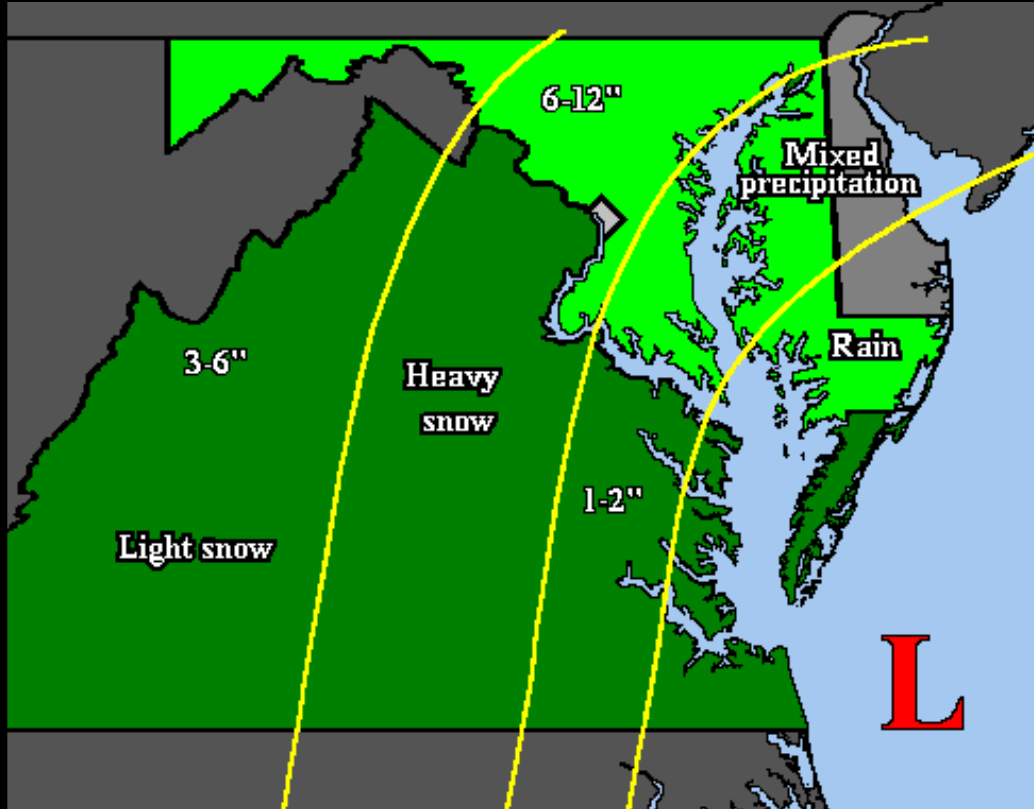


Classic Nor'easter Setup



High pressure centered north of DC. Low pressure or disturbance in the Gulf of Mexico.

Classic Nor'easter



The path of the storm plays a major role in determining what type of precipitation we receive and how much.

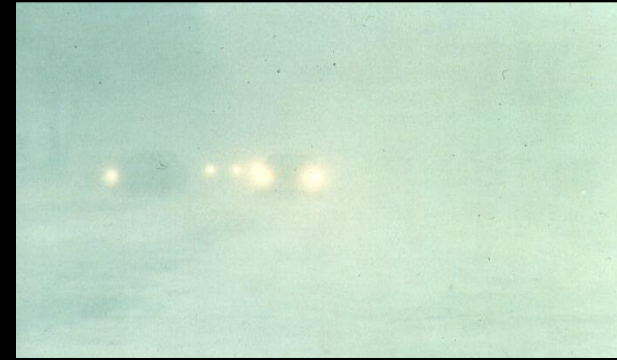
Alberta Clipper



- Quick moving low pressure system that originates in the Alberta Province of Canada.
- 1 to 5 inches of snow possible.
- Pulls down arctic air behind them.

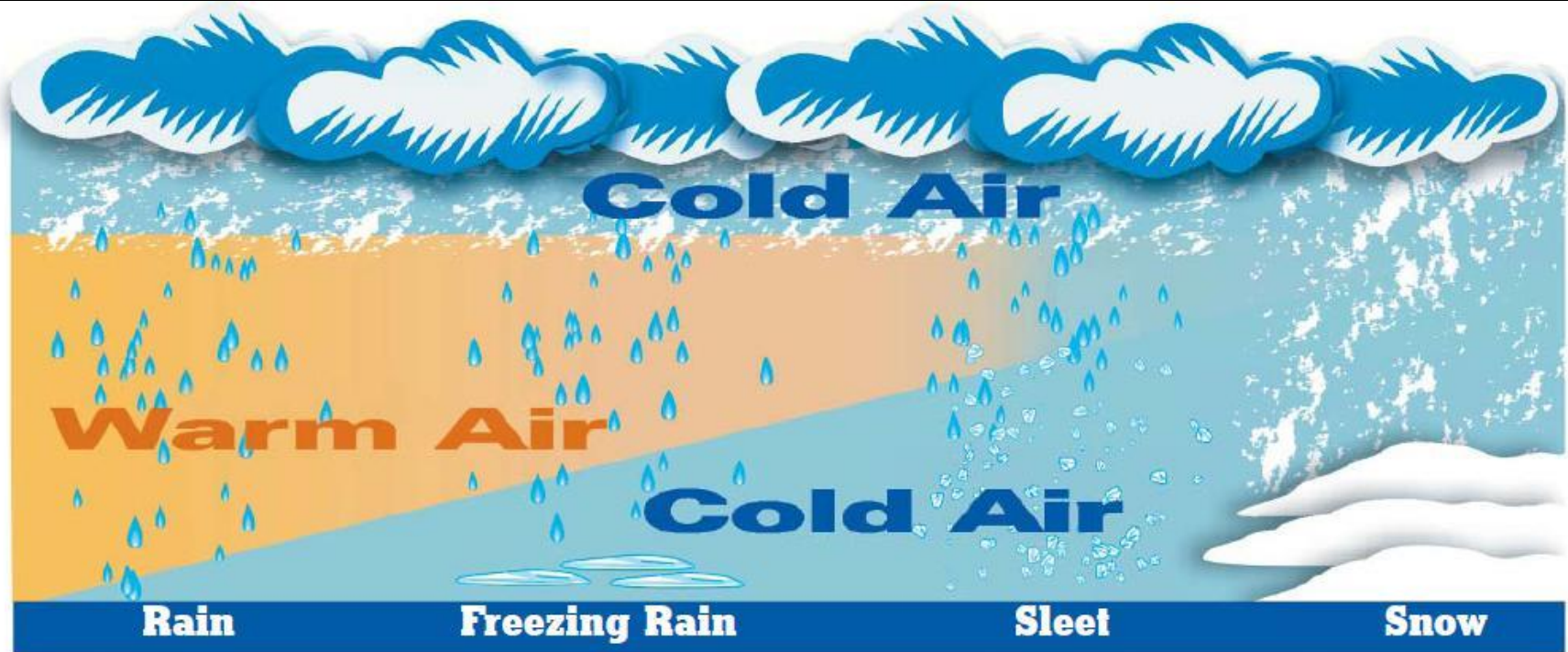
What is a Blizzard?

- Winds of 35 mph or more.
- Visibility near zero.



Film Clip Courtesy: J. Otavio Thompson of Washington DC
Feb 2010 Blizzard

What determines Precipitation Type?

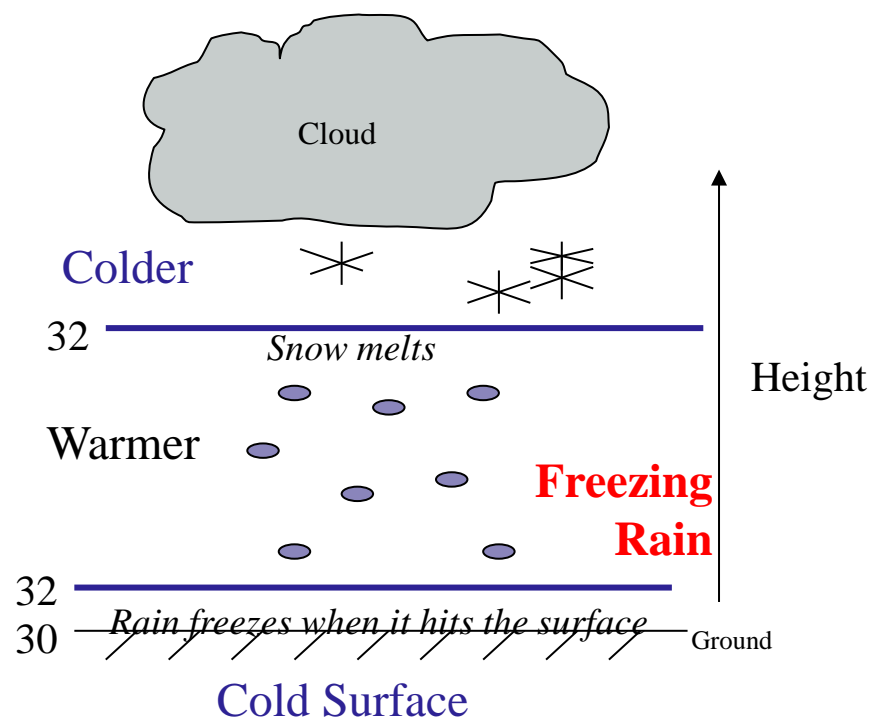
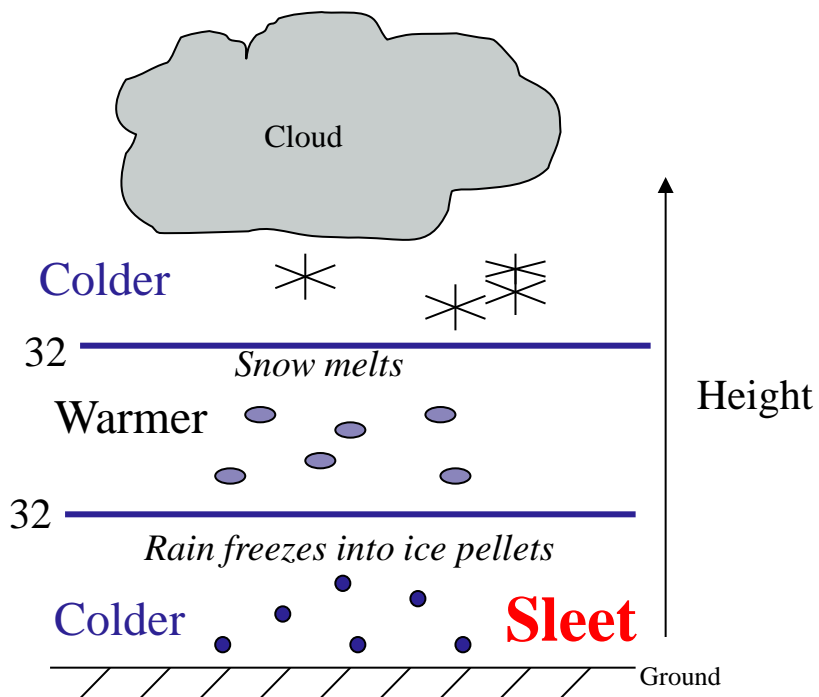
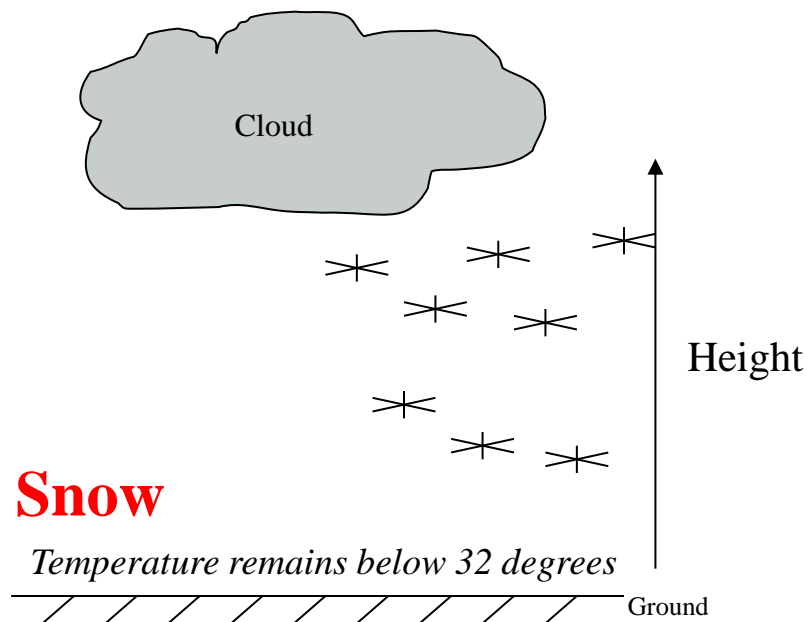
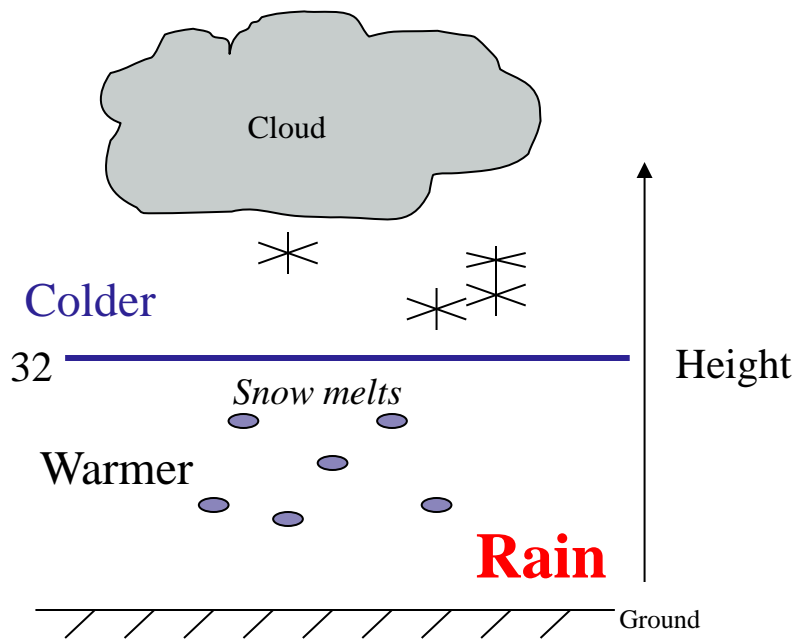


Rain
Frozen precipitation melts into rain

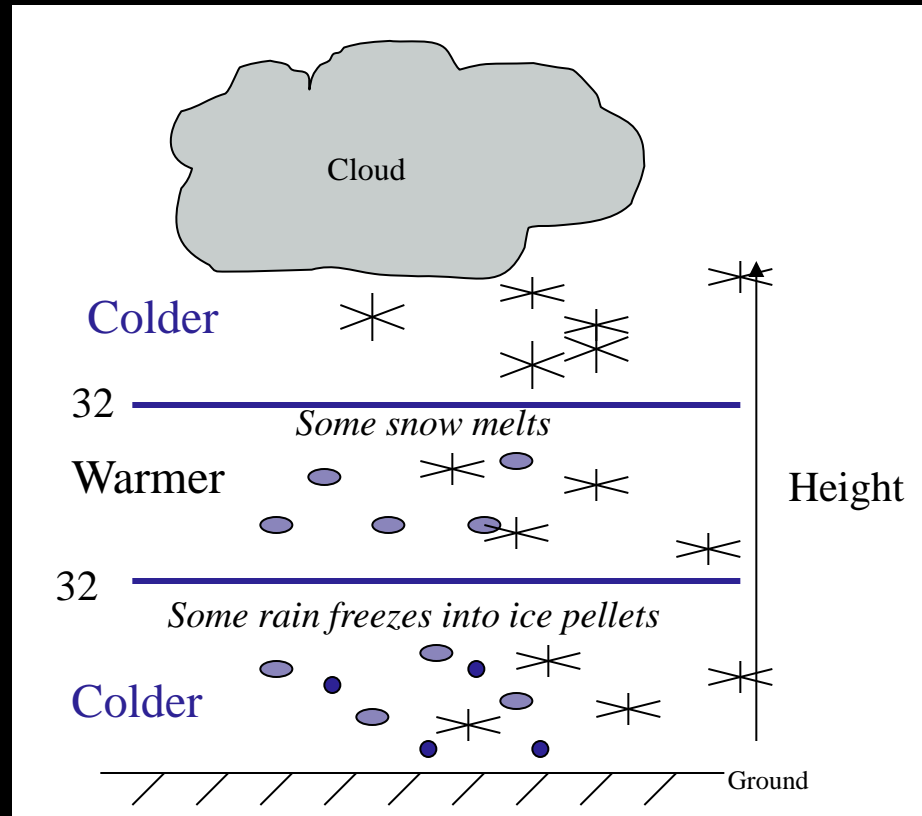
Freezing Rain
Frozen precipitation melts in warm air...
...rain falls and freezes on cold surfaces as a sheet of ice

Sleet
Frozen precipitation melts...
...refreezes into sleet before hitting ground

Snow
Snow falling into cold air never melts

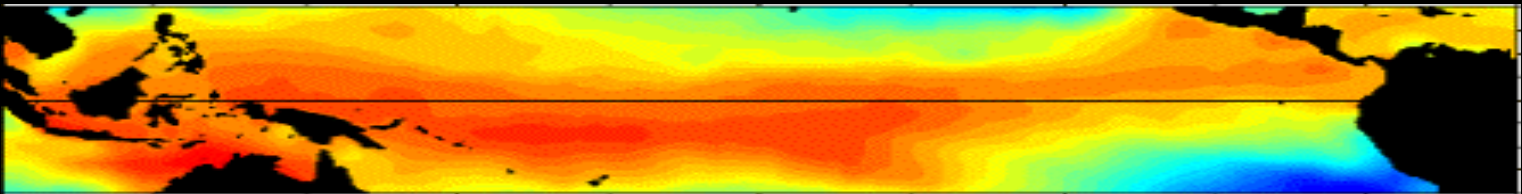


Mixed Precipitation Profile



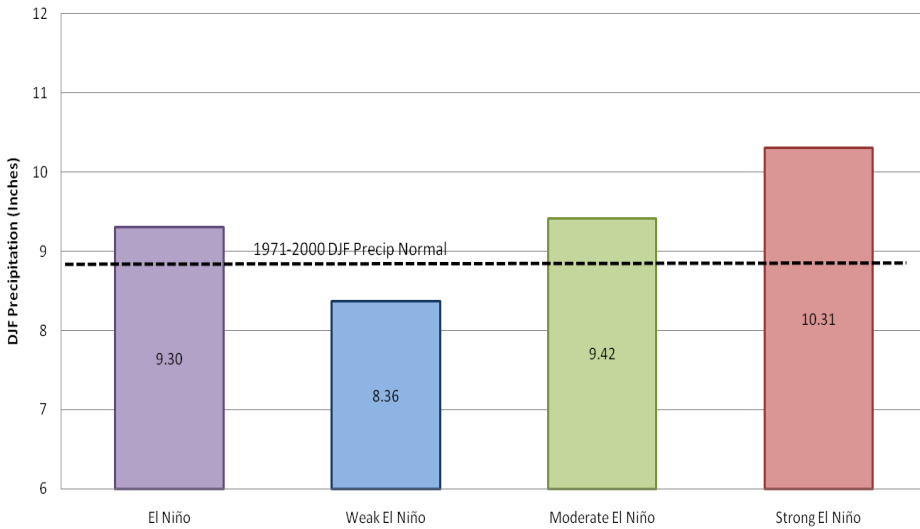
El Nino

- Warmer than Normal Decembers
- Normal or below normal JFM
- Increases the strength of the Southern (or sub-tropical) jet stream
- Increase risk of Nor'easters
 - Cold air will determine if this is snow or rain and that will depend on the Polar Jet

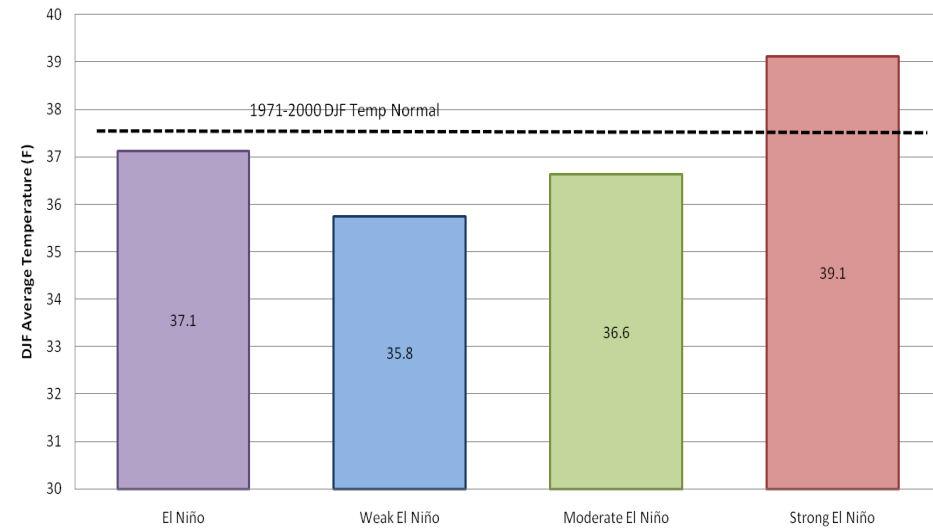


El Niño Winters at DC

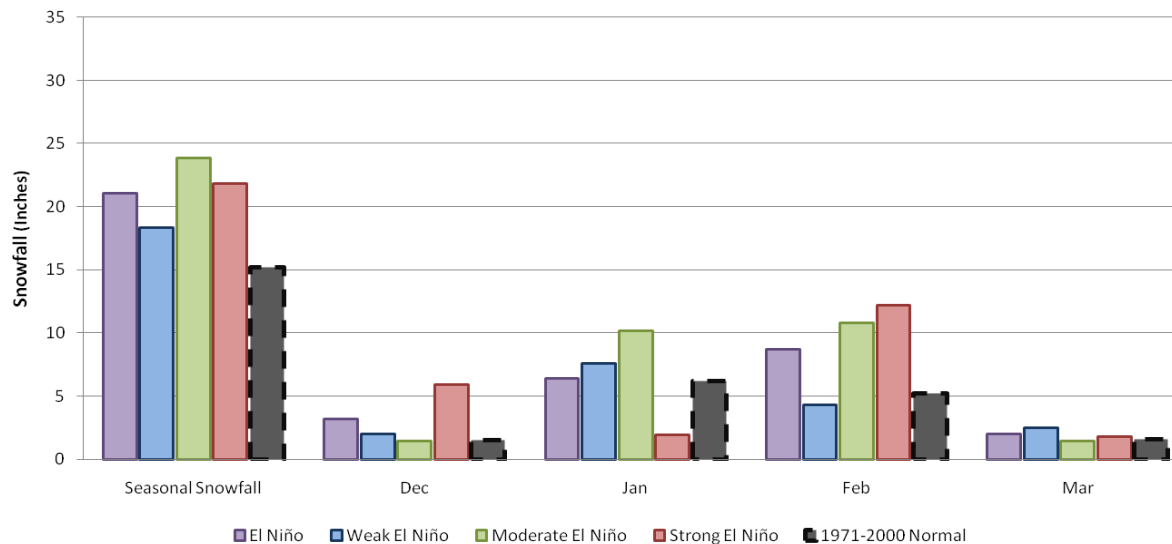
(1950-2010) D-J-F Avg. Precipitation at Washington DC (El Niño Years)



(1950-2010) D-J-F Avg. Temperatures at Washington DC (El Niño Years)

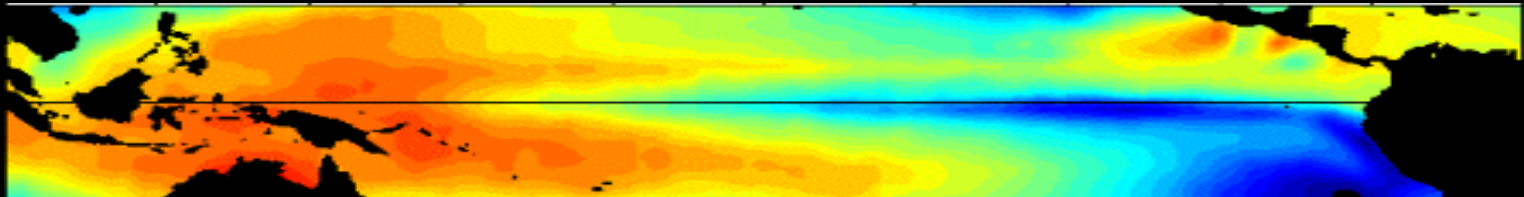


(1950-2010) Avg. Snowfall at Washington DC (El Niño Years)



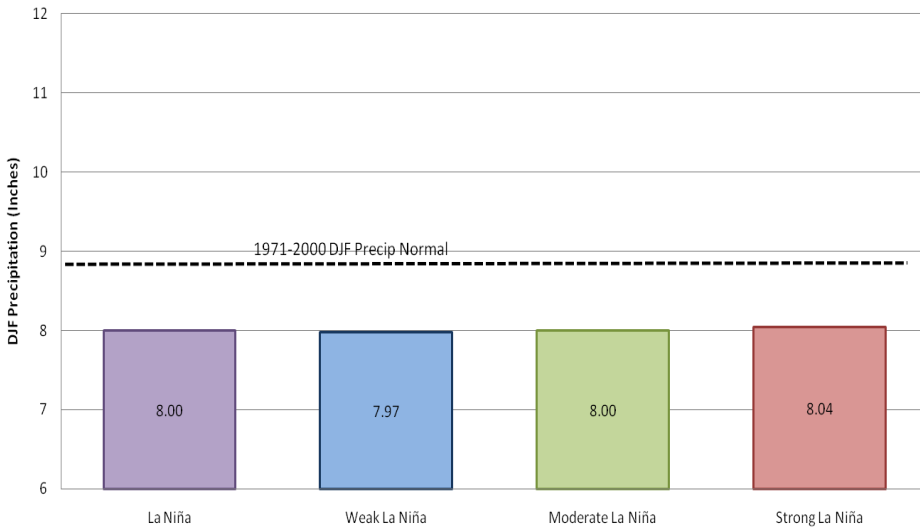
La Nina

- Milder Winter
- Drier Winter
- Decreased risk of Arctic Outbreaks

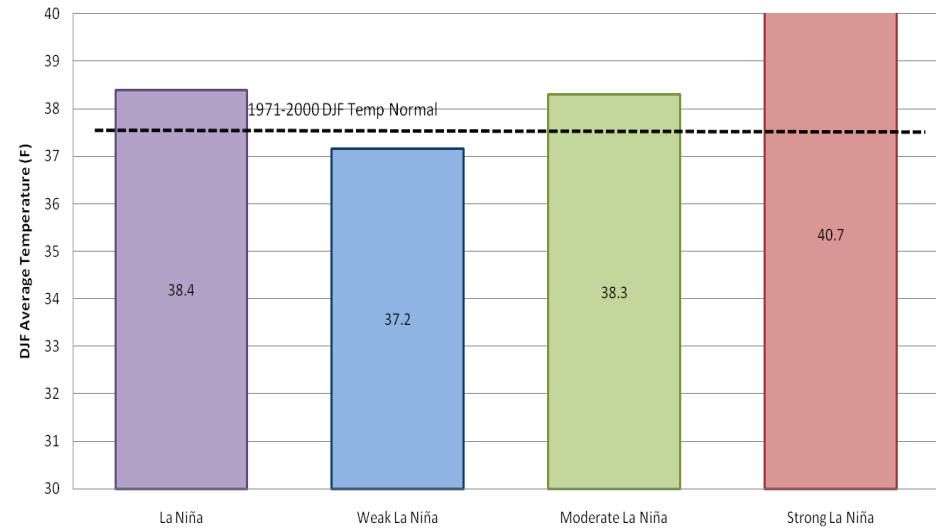


La Niña Winters at DC

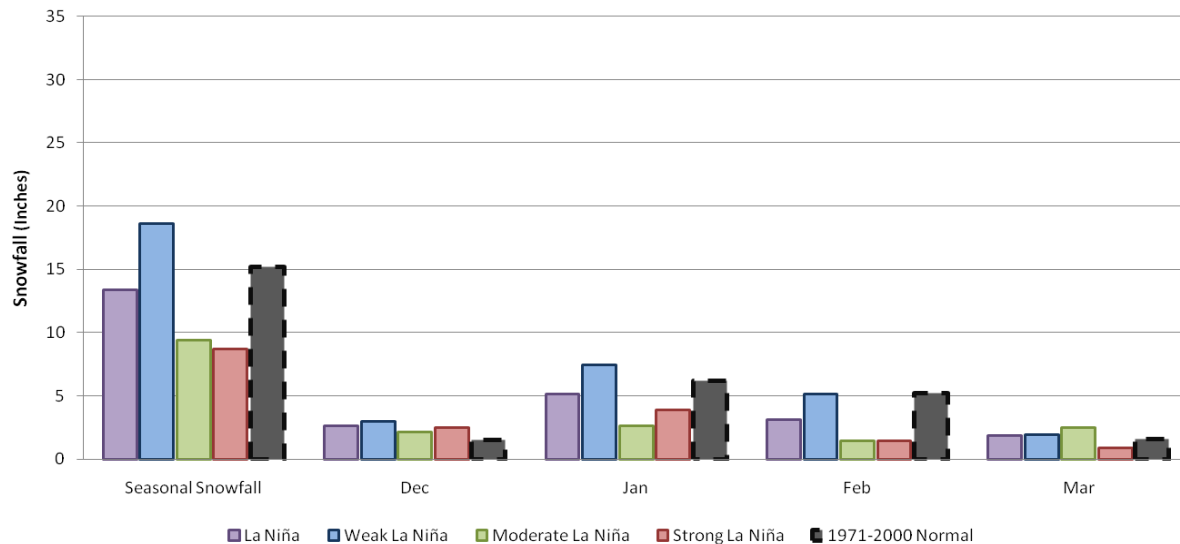
(1950-2010) D-J-F Avg. Precipitation at
Washington DC (La Niña Years)



(1950-2010) D-J-F Avg. Temperatures at
Washington DC (La Niña Years)



(1950-2010) Avg. Snowfall at
Washington DC (La Niña Years)



Winter Hazards

• Heavy Snow

• Ice

• Cold Outbreaks

• Wind

• Flooding

SUPER BOWL (& CABIN) FEVER
IN SPORTS: GAME PREVIEW AND ANALYSIS • LIVE UPDATES ONLINE: WASHINGTONPOST.COM/SPORTS

The Washington Post

Monday, February 7, 2010

A HISTORIC MESS

POWERLESS: Officials across area consider opening shelters for tens of thousands without heat. **STALLED:** 32 inches of snow shutters buses; other airports, rail and roads still struggling to dig out.

On Third Street in downtown D.C., residents assess damage from blizzard snow. Snow piled up on roofs and streets. Conditions throughout the area Saturday prompted the Postal Service to cancel deliveries.

GOING NOWHERE FAST
Plowing, outages will keep plans on ice

By Andrew Huxley III

The big blizzard that hit the Washington area Saturday night and early Sunday morning left tens of thousands of commuters stranded in the snow. The city's public transit system is struggling to get back on track, and many roads are still closed. Officials are considering opening shelters for tens of thousands of people who are stranded without heat.

IN WHITOUT, MANY THINGS COME TO A STANDSTILL

By Sarah M. Huxley and Andrew Huxley III

The Washington region was paralyzed by a blizzard Saturday night and early Sunday morning. The snow piled up on roofs and streets, and many roads were closed. The city's public transit system is struggling to get back on track, and many roads are still closed. Officials are considering opening shelters for tens of thousands of people who are stranded without heat.

SNOW TOTALS

Location	Snow Total (inches)
Washington, D.C.	32
Rockville, Md.	28
Frederick, Md.	24
Bethesda, Md.	20
Silver Spring, Md.	16
Gaithersburg, Md.	12
Rockville, Md.	8
Frederick, Md.	4
Bethesda, Md.	0
Silver Spring, Md.	0
Gaithersburg, Md.	0

With speech, Palin bounds back on the political stage

By Philip Brinkman and Ann Coonahan

Michelle Obama's speech on Tuesday night was a political event in itself. The first lady's remarks were a powerful statement on the role of the first lady in the White House. She spoke of her own journey and the challenges she has faced. Her speech was a testament to her strength and resilience.

Hall of Fame makes way for a 'Hog'

By Mike Manno

The National Football League's Hall of Fame is a place of honor for the greatest players in the game. But this year, the league is considering adding a new player to the hall. The player in question is a former NFL player who has since become a successful businessman. The league is considering adding him to the hall as a way of honoring his achievements both on and off the field.

It's Colts-Saints for all the marbles SPORTS

THE BALTIMORE SUN

balTIMOREsun.com

SNOWED OUT

► State digging out after being hit by up to 3 feet of accumulation
► I-95 stifled, BWI paralyzed, tens of thousands without power

Unfettered driver walks on sidewalks, David Hart, left, and his Corolla walk north along St. Paul Street near Madison Street, as they return from shopping at the Mall of America.

INSIDE

Power outages Drive the city's power outages, but the city is still working to get power back on. The city is still working to get power back on.

Area travel comes to a standstill

BWI closed until Monday; many roads treacherous

By Michael Dwyer

The snow has caused a major travel crisis in the Baltimore area. The airport is closed, and many roads are impassable. The city is still working to get power back on.

TO OUR READERS

We value you as a customer, and we appreciate your understanding during this time of crisis. We are sorry for any inconvenience caused by the snow. We will be working to get power back on as soon as possible.

Heavy Snow



Washington Metro



Photo Courtesy: World Press



Photo Courtesy: frozenblog.com

Prince William Ice Rink

- Disrupts Transportation
- Closes Businesses/Schools
- Roof Collapse
- Downed Tree Limbs/Powerlines
- High Cost of Snow Removal



Photo Courtesy: Washington Examiner

Ice

- **Power and Communication lines come down**
- **Traffic Accidents**
- **Pedestrian Falls**
- **Heavy weight can bring down trees**



Mixing Bowl (Springfield, VA) Feb 12, 2008
Photo: Washington Post



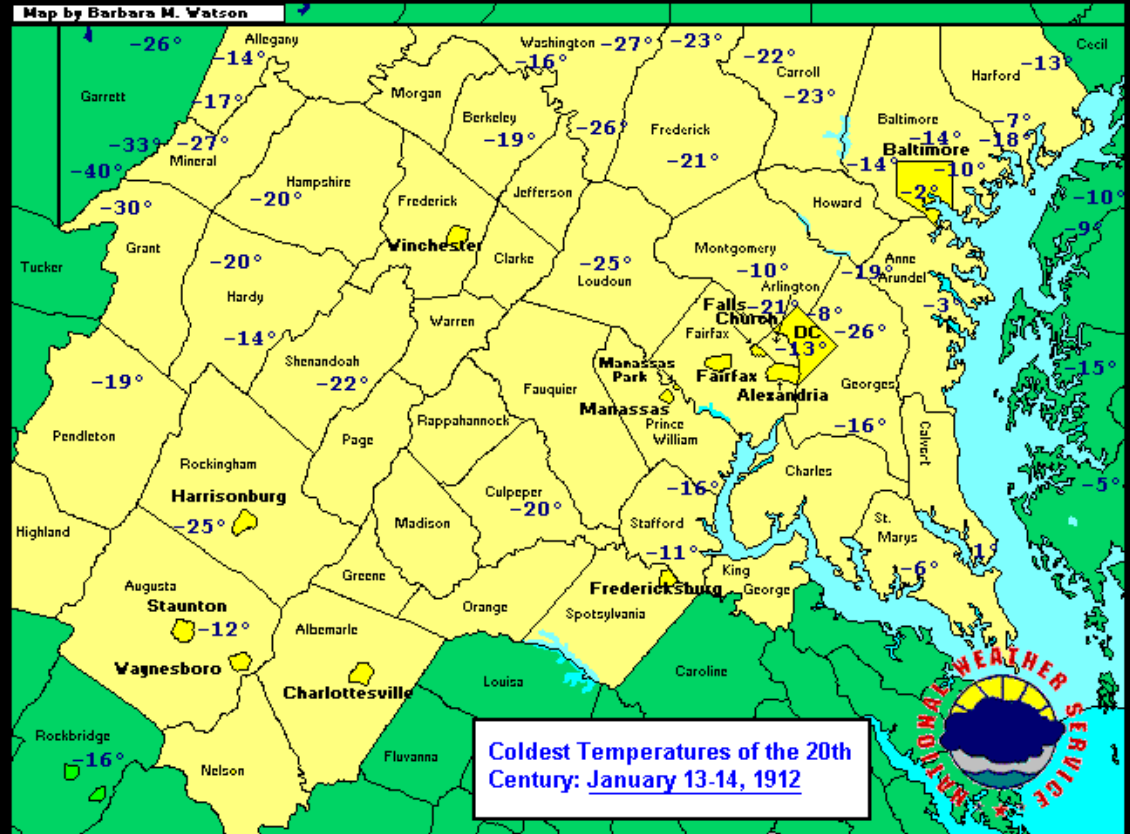
Photo By: Paul McCord, JR



Photo: Washington Post

Cold Air Outbreaks

- **Exposure**
 - **Frost Bite**
 - **Hypothermia**
- **Auto Trouble**
- **Burst pipes**
- **Power shortages**



Wind

- Blizzards
- Blowing and Drifting Snow
- Heavy Surf and Beach Erosion
- Coastal Flooding
- Trees and Utility Lines
- Wind Chill

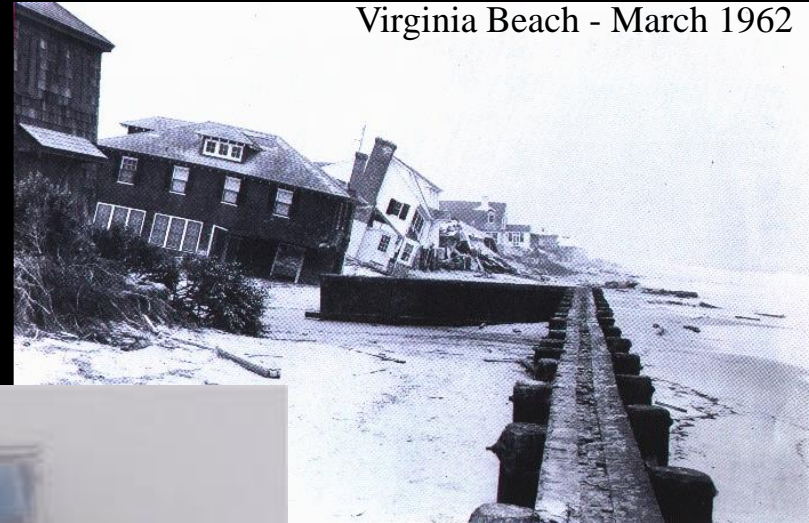
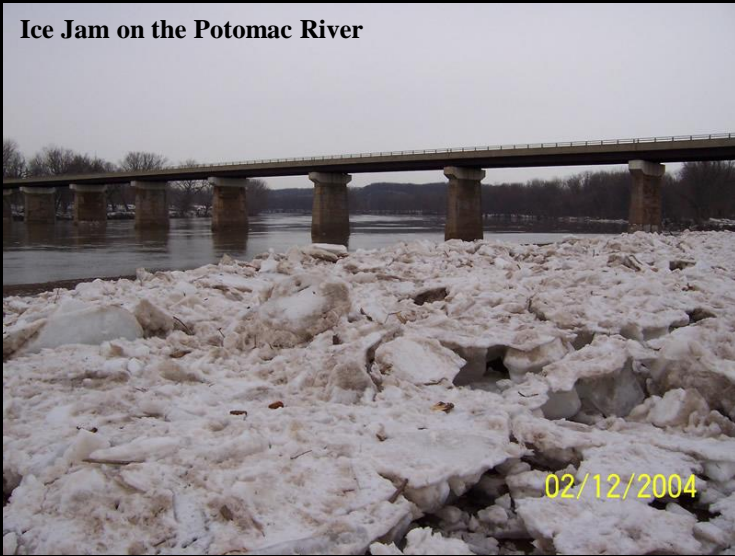


Photo By: Ian Sean Livingston

Winter Flooding

Ice Jam on the Potomac River



- **Coastal Flooding:** Tidal/coastal flooding generated by the intense winds in a coastal storm.
- **Ice Jams:** When a thaw or rise in water level breaks ice into large chunks that become jammed at man made and natural obstructions.
- **Sudden Snow Melt:** A sudden thaw of a heavy snow pack.

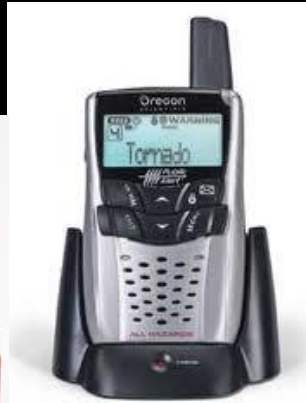


Stranded motorist near the Monocacy River
Photo Courtesy: Frederick News Post
December 2009

Preparing Yourself for Winter

...At Home...Before the Storm...

- Flashlights & Extra Batteries
- Extra Food & Water
- Extra Medicine, First Aid Kit & Baby Items
- Alternate Heat Source & Fuel
- Have Your Heating System Checked
- Fire Extinguishers & Smoke/Carbon Monoxide Detectors Checked
- NOAA Weather Radio



Preparing Yourself for Winter

...In the Car...Before the Storm or Trip...



- Cell Phone & Charger
- Flashlight & Batteries
- Keep Your gas tank near full
- First Aid Kit
- Let someone know where you are going
- Knife, Shovel, & Ice Scraper
- Don't travel alone
- Tool Kit
- Blankets/Sleeping Bags
- Water Container & Non Perishable High Energy Food
- Battery Cables
- Extra Clothing
- Sand/Cat Litter for Traction

Fully check and winterize your vehicle before the season!

Heavy Snow Safety

- **When shoveling, move smaller amounts of snow and take frequent breaks. Know your limits.**
- Heart Attack! Cold Weather Stresses the Heart**

- Add shoveling snow
- Or pushing car
- Or walking through deep

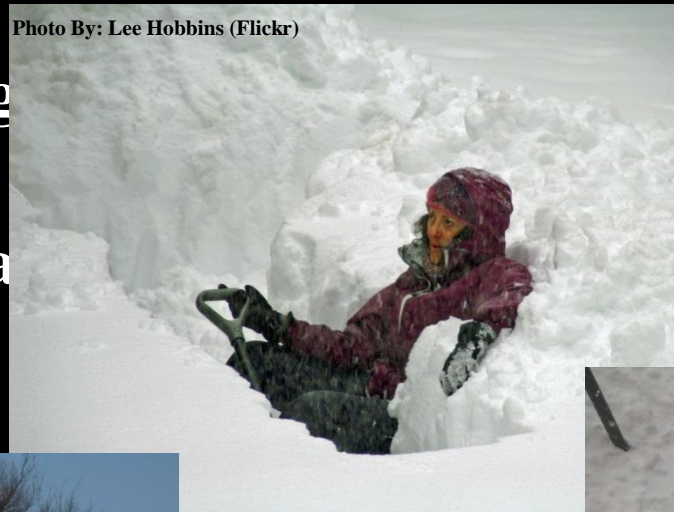


Photo By: Harold Neal (Flickr)



Photo By: Gersemalina (Flickr)



Dress for the Season

- 50% of your body heat is lost through your head and neck area
- Wear layers to trap heat
- Wear hats, scarves, gloves, snow boots

Stay Warm and Dry

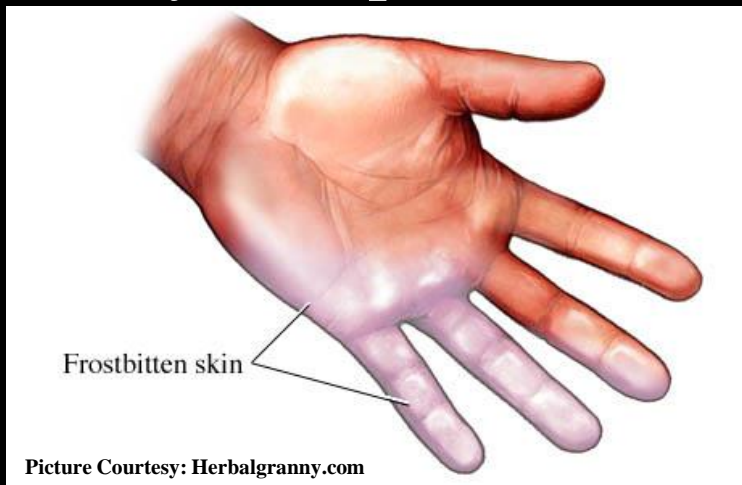


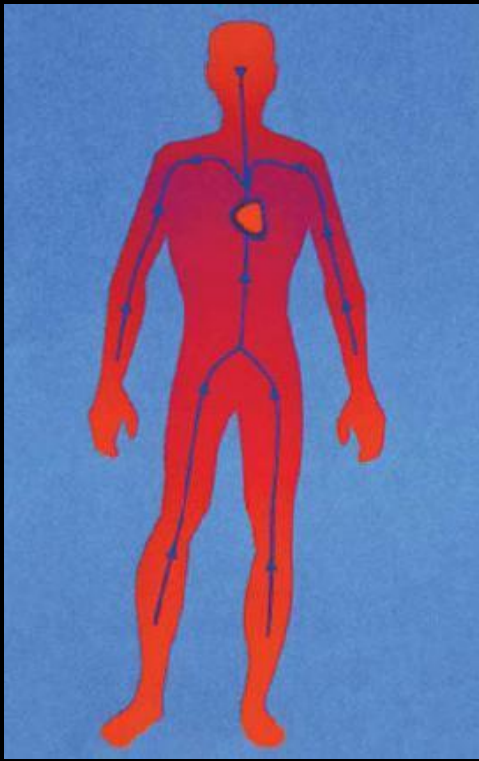
Wind Chill

is not the actual temperature but rather how wind and cold feel on exposed skin.

Frostbite

- Damage to body tissue caused by extreme cold
- Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, earlobes, or the tip of the nose
- If symptoms present: **Get Medical Attention Immediately!!!**





Hypothermia occurs when the body's extremities are blood starved.
extremities to the heart,
leading to heart failure.

Hypothermia

- Condition brought on when the body temperature drops to less than 95 F
- Warning signs include:
 - Uncontrollable Shivering
 - Memory Loss/Disorientation
 - Incoherence/Slurred Speech
 - Apparent Exhaustion/Drowsiness

If Medical Care is Not Available

- Warm the person slowly – starting with the body core
- If necessary, use your body heat to help
- Get the person into dry clothing and wrap in a warm blanket covering head and neck
- **DO NOT** give the person alcohol, drugs, coffee or any hot beverage or food

Injuries Related to Cold

- 50% Happen to people over 60 years old
- More than 75% happen to males
- About 20% occur in the home

Stuck Outdoors in Heavy Snow

- Get out of the wind and try to stay warm and dry
- Find shelter or build one with sticks and/or snow
- If possible, build a fire
placing rocks around it to absorb heat
- Eat high-energy food. **Do not eat snow!** Melt it first and then drink it if necessary



Photo By: Fancypicnic (Flickr)

Stuck Outdoors in Your Vehicle

- Stay in your car or truck
- Run motor about 10 minutes every hour for heat
 - Make sure the exhaust pipe is clear of snow
 - Open window a crack to prevent carbon monoxide poisoning
- Exercise from time to time to stimulate your circulation and help keep you warm
- Tie a red cloth to your antenna or door to help indicate to rescuers that you are in trouble



National Guard Troops help clear stranded motorists from U.S. 15 on Feb 11, 2010.

NWS Products & Services

•Beyond 7 Days: Climate Prediction Center

- Seasonal Outlooks
- Monthly Outlooks
- 8-14 Day & 6-10 Day Outlooks
- National Maps
- www.cpc.noaa.gov

National Weather Service
Climate Prediction Center

Home Site Map News Organization

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Storm Tracks
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Climate News
• **La Niña Advisory Issued**
• **NOAA 2010 Updated Atlantic Hurricane Season Outlook**
• **NOAA's 35th Climate Diagnostics & Prediction Workshop**

Click on product title to go to product page. Move cursor over product parameter name to display the graphic -- click to enlarge. Links to these same products are also available below.

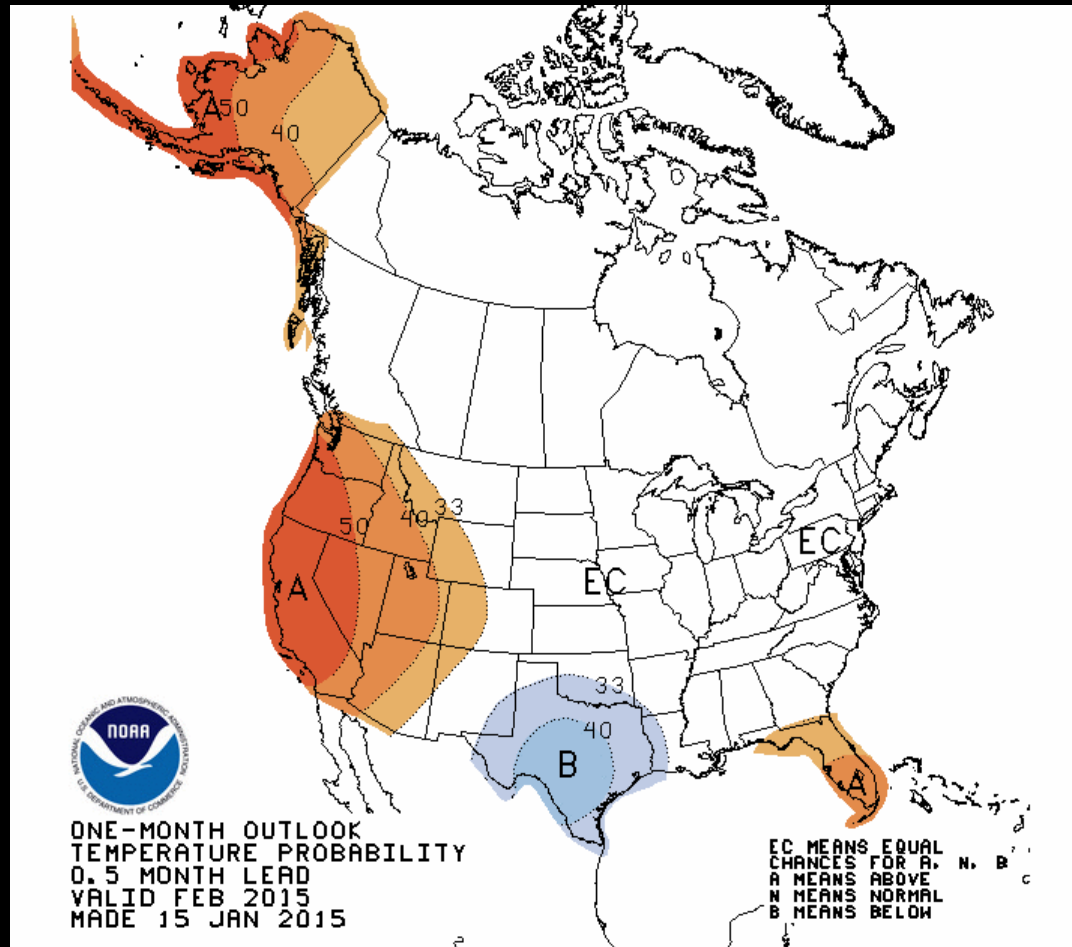
6-10 Day Outlook		One Month Outlook	
Temperature	Precipitation	Temperature	Precipitation
8-14 Day Outlook		Three Month Outlook	
Temperature	Precipitation	Temperature	Precipitation
U.S. Hazards Assessment		U.S. Drought Assessment	
Temp./Wind	Precip. Soil/Wildfire Composite	Drought Monitor	Drought Outlook

ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.0 MONTH LEAD
VALID SEP 2010
MADE 31 AUG 2010

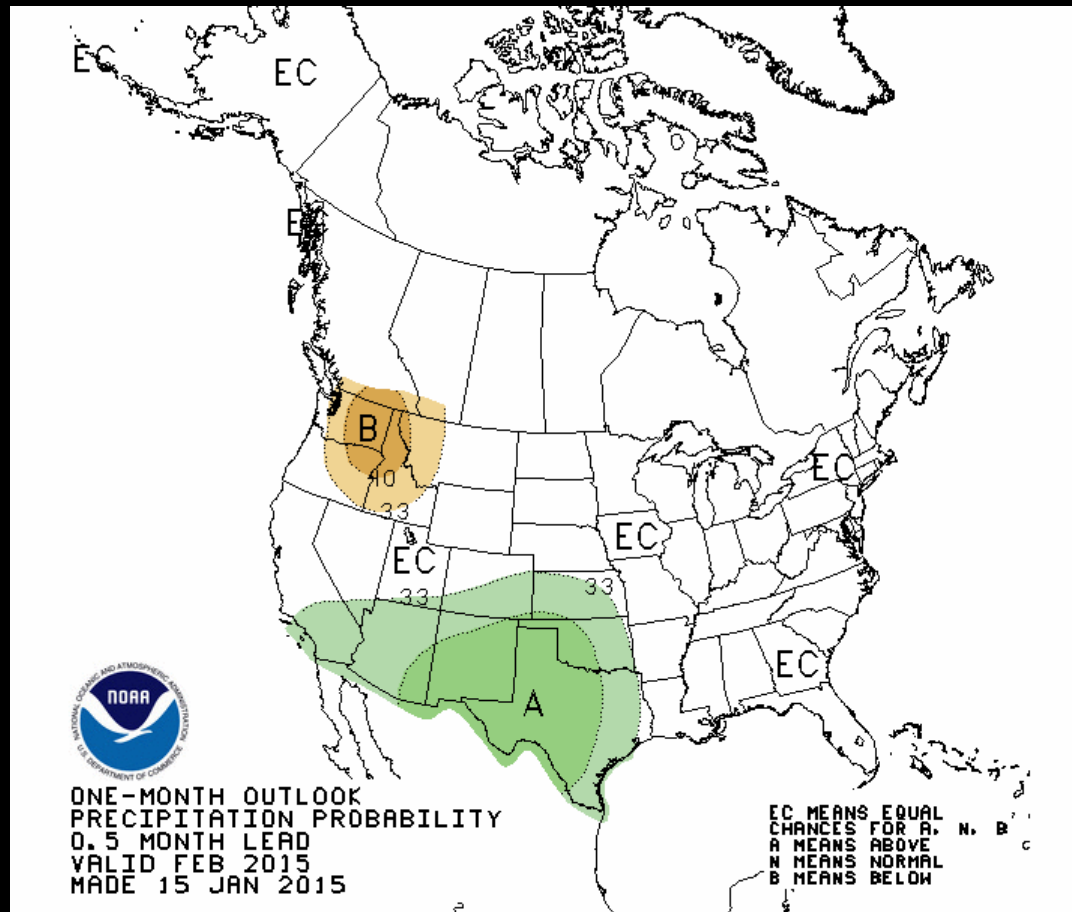
EC MEANS EQUAL CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

Related Products
6-10 Day Outlook, 8-14 Day Outlook, 30 Day Outlook, 90 Day Outlook, U.S. Hazards Assessment, Drought Assessment

Temperature 30-Day Outlook

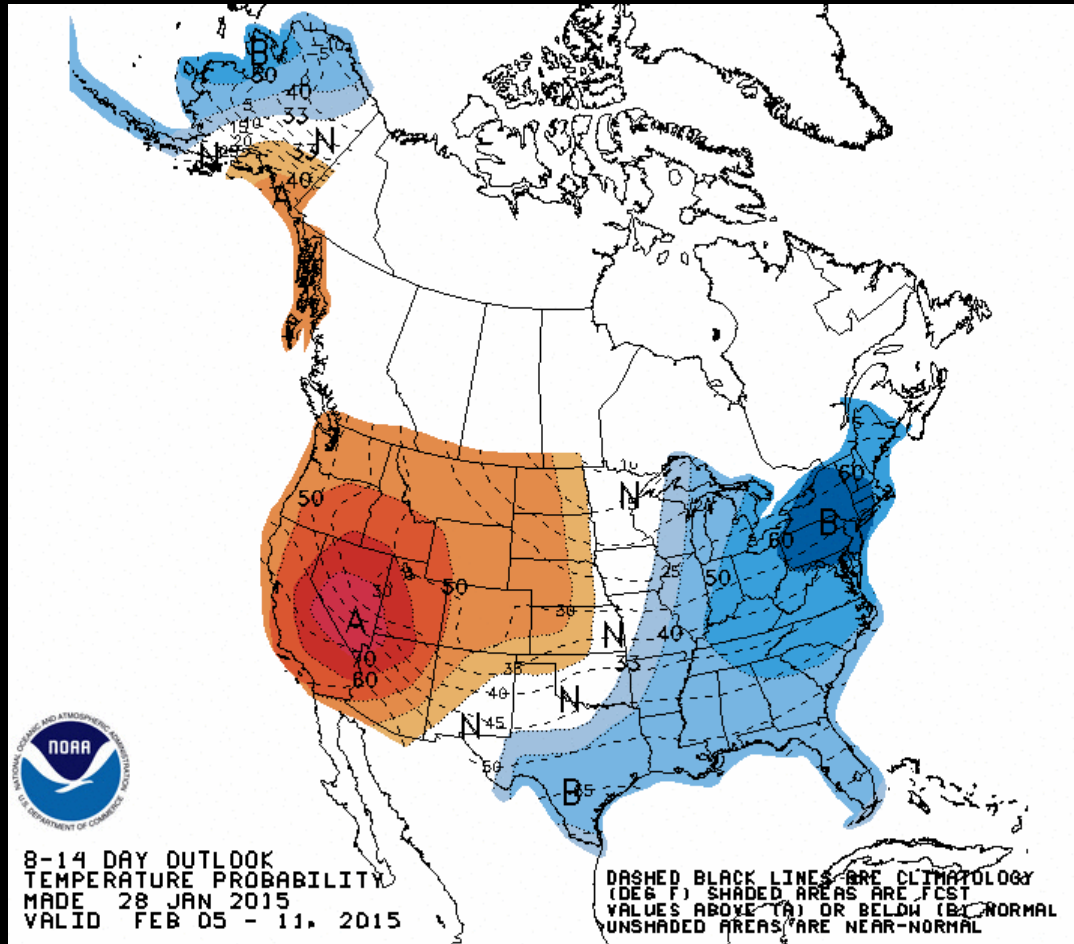


Precipitation 30-Day Outlook

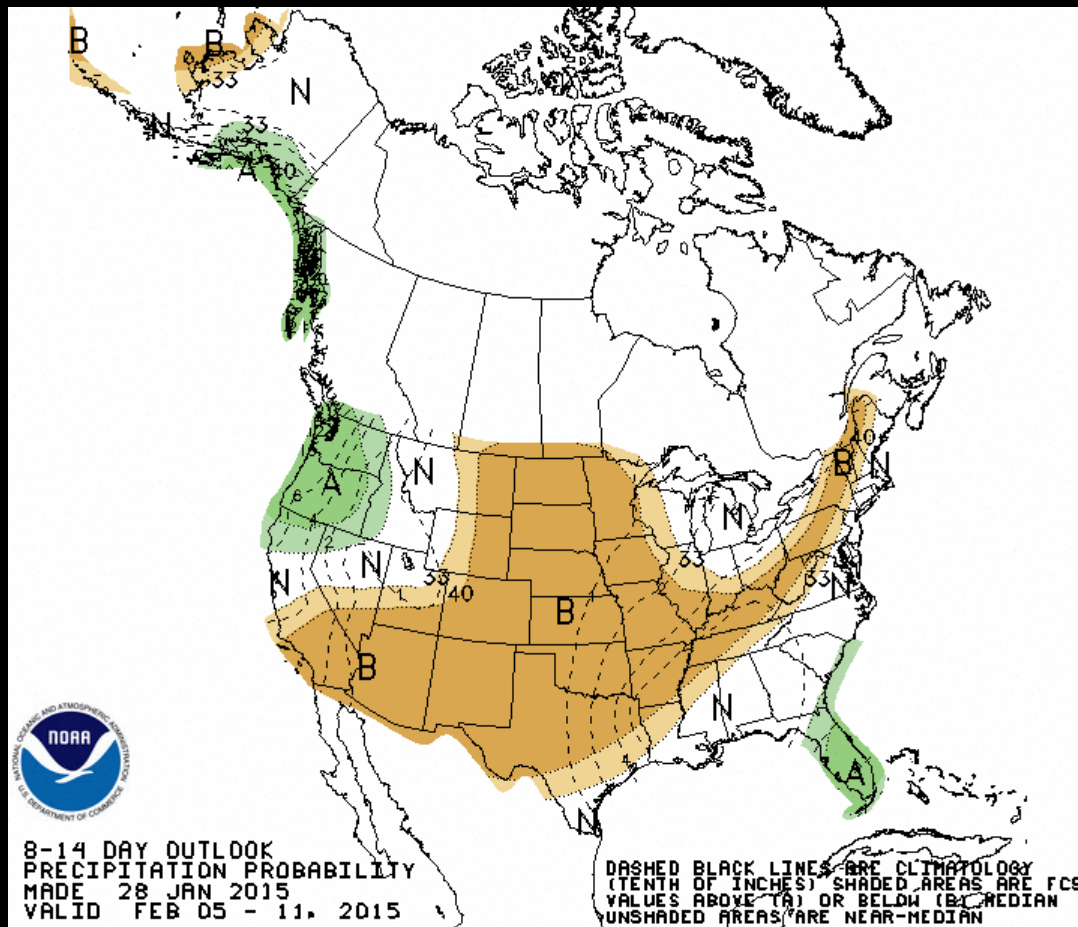


Temperature

8-14 Day Outlook



Precipitation 8-14 Day Outlook



NWS Products & Services

Winter Weather Outlook
Hazardous Weather Outlook

Potential for hazardous weather in the next 48 hours.

• Issued when a winter weather event has the potential to threaten life and property in the area.

Winter Storm Watch

• Provides information to users that need considerable lead time to prepare for an event

Winter Storm Warning

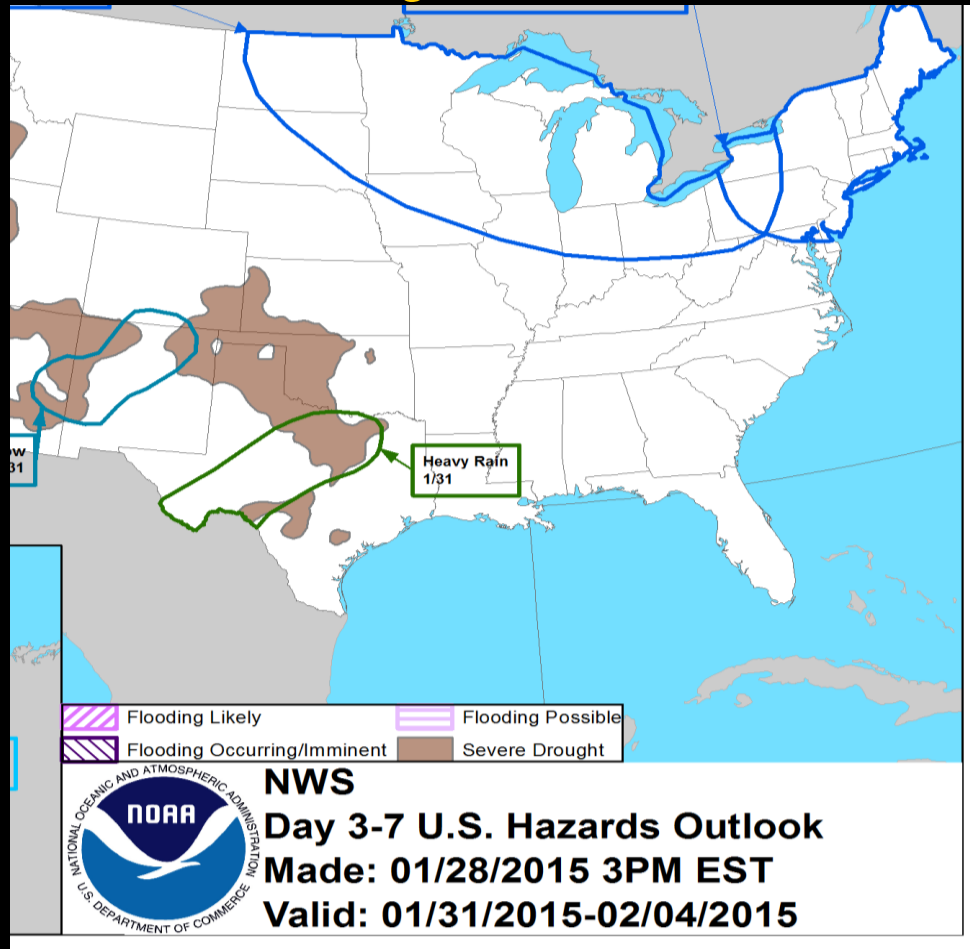
- Imminent or Occurring
- Life Threatening Conditions
- Damage to Property

Winter Weather Advisory

- Imminent or Occurring
- Significant Inconvenience

US Hazards

3-7 Day Outlook



NWS Products & Services

Winter Weather Page

The screenshot shows the NWS Baltimore/Washington website. A red arrow points from the 'Winter Weather Page' text to the 'Winter' link in the 'Current Hazards' dropdown menu. The website header includes the NWS logo and navigation links: HOME, FORECAST, PAST WEATHER, WEATHER SAFETY, INFORMATION CENTER, NEWS, SEARCH, and ABOUT. The main content area features a 'Customize Your Weather.gov' sidebar, a 'News Headlines' section with a link to '2015 Spotter Classes Now Available!', and a 'NWS Forecast Office Baltimore/Washington' section. The 'Current Hazards' dropdown menu is open, showing links for Local Outlook, Winter, Drought, Fire Weather, Space Weather, River Flooding, Briefing Page, Watches/Warnings, Thunderstorms, and Hurricanes. A map of the Baltimore/Washington area is displayed, with a 'Zoom Out' button. To the right of the map, there are links for 'Watches, Warnings & Advisories', 'Gale Warning', 'Winter Weather Advisory', 'Small Craft Advisory', and 'Hazardous Weather Outlook'. The bottom of the page features a grid of icons for various weather products: Radar, Current Weather, Rivers & Lakes, Satellite, Weather Information Display, Forecast Maps, Hour by Hour Forecast, Detailed Forecast, Marine Forecasts, Air Quality, Forecaster's Discussion, and Text Bulletins.

- **Within 7 Days: NWS Baltimore/Washington**
- **Hazardous Weather Outlook**
- **Public/Marine Forecasts**
- **Watches/Warnings**
- **www.weather.gov/baltimore or www.weather.gov/washington**

Hazardous Weather Outlook

Outlook on potential
for any Hazardous
Weather through 7
Days.

Day 1:

• More Details between 5
• Watches/Warnings
in Effect 11 am.

• Timing as needed.

• Areal Specificity

Days 2-7:

• Less areal and
timing specificity
• Potential for
Activation
Watches/Warnings

1152 AM EST SAT FEB 6 2010

THIS HAZARDOUS WEATHER OUTLOOK IS FOR THE MARYLAND PORTION OF THE CHESAPEAKE BAY...TIDAL POTOMAC RIVER...AND ADJACENT COUNTIES IN CENTRAL MARYLAND AND NORTHERN VIRGINIA AS WELL AS THE DISTRICT OF COLUMBIA.

.DAY ONE...THIS AFTERNOON AND TONIGHT

A BLIZZARD WARNING REMAINS IN EFFECT UNTIL 10 PM TONIGHT FOR THE DISTRICT OF COLUMBIA...ANNE ARUNDEL...BALTIMORE...HARFORD...CALVERT...CHARLES...PRINCE GEORGES AND ST. MARYS COUNTIES. PLEASE REFER TO THE LATEST WINTER WEATHER MESSAGE /WSWLWX/ FOR FURTHER DETAILS.

A WINTER STORM WARNING FOR SNOW REMAINS IN EFFECT ELSEWHERE UNTIL 10 PM TONIGHT. MODERATE TO HEAVY SNOW IS EXPECTED TODAY. PLEASE REFER TO THE LATEST WINTER WEATHER MESSAGE /WSWLWX/ FOR FURTHER DETAILS.

GALE WARNINGS AND SMALL CRAFT ADVISORIES ARE IN EFFECT THROUGH TONIGHT FOR THE MARYLAND CHESAPEAKE BAY AND TIDAL POTOMAC RIVER. PLEASE REFER TO THE LATEST MARINE WARNING MESSAGE /MWLWX/ FOR FURTHER DETAILS.

.DAYS TWO THROUGH SEVEN...SUNDAY THROUGH FRIDAY

A SMALL CRAFT ADVISORY IS IN EFFECT FOR THE LOWER TIDAL POTOMAC AND MARYLAND CHESAPEAKE BAY UNTIL NOON SUNDAY.

THERE IS A POSSIBILITY OF ACCUMULATING WINTRY PRECIPITATION TUESDAY AND WEDNESDAY. PLEASE MONITOR FORECASTS FOR THE LATEST INFORMATION ON THIS POSSIBLE STORM.

.SPOTTER INFORMATION STATEMENT...

SPOTTER ACTIVATION IS NOT ANTICIPATED THROUGH TONIGHT. PLEASE RELAY SNOW REPORTS TO THE NATIONAL WEATHER SERVICE.

What Kind of Information Does a Watch Include?

A Winter Storm

- When 5+ inches of snow period

- Ice Accumulation

- A damaging winds with

- Typical the event

148 PM EST THU DEC 17 2009

...WINTER STORM WATCH IN EFFECT FROM LATE FRIDAY NIGHT THROUGH LATE SATURDAY NIGHT...

THE NATIONAL WEATHER SERVICE IN STERLING VIRGINIA HAS ISSUED A WINTER STORM WATCH...IN EFFECT FROM LATE FRIDAY NIGHT THROUGH LATE SATURDAY NIGHT.

* PRECIP TYPE...SNOW...AND/OR ICE
1/4 inch

* ACCUMULATIONS...PEAVY SNOW WITH ACCUMULATIONS GREATER THAN 1 INCHES. OR 1/4 INCH OF ICE OR A COMBINATION OF THE TWO WITH HIGH WINDS

* TIMING...SNOW WILL BEGIN LATE FRIDAY NIGHT AND WILL CONTINUE THROUGH SUNDAY MORNING. 24 to 48 hours in advance
GENERAL WORDING

* TEMPERATURES...UPPER 20S TO LOWER 30S THROUGH THE EVENT.

* WINDS...10 TO 20 MPH THROUGH THE EVENT...WITH GUSTS OF 25 TO 30 MPH SATURDAY AND SUNDAY.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A WINTER STORM WATCH MEANS THERE IS A POTENTIAL FOR SIGNIFICANT SNOW THAT MAY IMPACT TRAVEL. CONTINUE TO MONITOR THE LATEST FORECASTS.

&&

Key Word is:

Winter Storm Warning

A Winter Storm
has a high probability of

• 5+ Inches

• snow in 24 hours

• A life threatening

• snow and ice

• A combination of

BECOMES MORE SPECIFIC

Key Words:

1207 PM EST FRI DEC 18 2009

...WINTER STORM WARNING REMAINS IN EFFECT FROM 6 PM THIS EVENING TO 6 AM EST SUNDAY...

A WINTER STORM WARNING REMAINS IN EFFECT FROM 6 PM THIS EVENING TO 6 AM EST SUNDAY.

* PRECIPITATION TYPE... SNOW.

OR DAMAGING/LIFE TREATENING
COMBINATION OF
SNOW/ICE/SLEET WITH HIGH WINDS

* ACCUMULATIONS...HEAVY SNOW WITH ACCUMULATIONS OF 1 TO 2 FEET THROUGH SATURDAY NIGHT...WITH THE HIGHER AMOUNTS AT HIGHER ELEVATIONS.

* TIMING...SNOW WILL BEGIN BETWEEN 6 AND 9 PM FRIDAY EVENING AND WILL CONTINUE THROUGH SATURDAY NIGHT. SNOW WILL BE HEAVIEST FROM 1 AM TO 3 PM SATURDAY.

* TEMPERATURES...BELOW FREEZING THROUGH THE EVENT. MID TO UPPER 20S IN THE VALLEYS AND FOOTHILLS...LOWER TO MID 20S IN THE MOUNTAINS.

* WINDS...10 TO 15 MPH THROUGH THE EVENT WITH GUSTS TO 25 MPH ON SATURDAY AND SUNDAY.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A WINTER STORM WARNING MEANS SIGNIFICANT AMOUNTS OF SNOW ARE EXPECTED OR OCCURRING. STRONG WINDS ARE ALSO POSSIBLE. CONDITIONS WILL DETERIORATE VERY RAPIDLY LATE TONIGHT AND WILL MAKE TRAVEL EXTREMELY TREACHEROUS.

&&

A Winter Weather Advisory contains the same information as a Winter Storm Warning.

A Winter Weather Advisory

- When

- signifies

- for a warning

- Average

- within a

- 24 hour

- ANY a

- freezing

- Usually

814 PM EST SAT DEC 12 2009

...WINTER WEATHER ADVISORY REMAINS IN EFFECT FROM 1 AM TO 10 AM EST SUNDAY...

A WINTER WEATHER ADVISORY REMAINS IN EFFECT FROM 1 AM TO 10 AM EST SUNDAY.

* PRECIPITATION TYPE...A LIGHT WINTRY MIX OF SLEET AND FREEZING RAIN IS EXPECTED OVERNIGHT.

* ACCUMULATION...UP TO ONE TENTH OF AN INCH OF ICE WILL BE POSSIBLE ACROSS THE SHENANDOAH VALLEY.

* TIMING...A BRIEF PERIOD OF SLEET WILL MIX WITH AND CHANGE TO FREEZING RAIN ACROSS THE SHENANDOAH VALLEY AND SOUTHERN POTOMAC HIGHLANDS AFTER MIDNIGHT.

* TEMPERATURES...TEMPERATURES WILL STAY IN THE UPPER 20S AND LOWER 30S OVERNIGHT...AND RISE ABOVE FREEZING DURING THE MORNING.

* WINDS...WINDS WILL BE FROM THE SOUTH AROUND 5 MPH.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

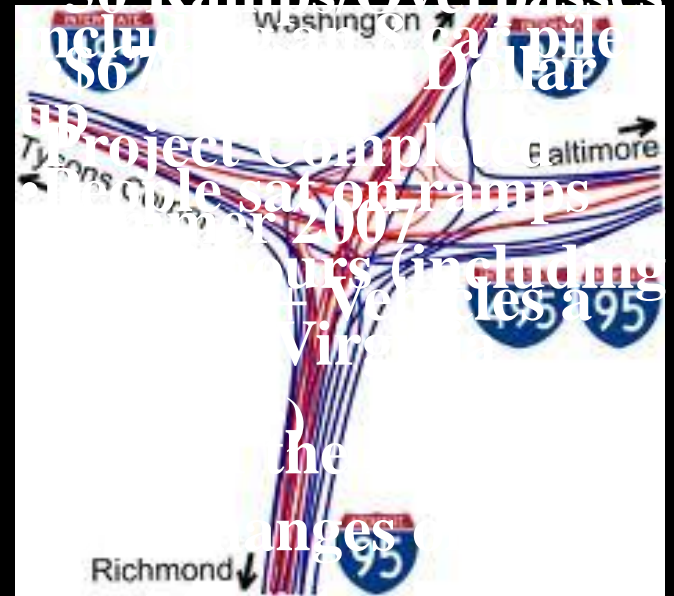
A WINTER WEATHER ADVISORY MEANS THAT PERIODS OF SNOW...SLEET...OR FREEZING RAIN WILL CAUSE TRAVEL DIFFICULTIES. BE PREPARED FOR SLIPPERY ROADS AND LIMITED VISIBILITIES...AND USE CAUTION WHILE DRIVING.

How much trouble can one tenth of an inch of ice cause???

Date: February 12, 2008



- 15+ Car accidents
- 50+ Ramps/Overpasses
- 100+ Project Closures
- 100+ Vehicle collisions
- 100+ Vehicles involved
- 100+ Injuries
- 100+ Property damages
- 100+ East Coast



Just a Couple of Notes....

An **Ice Storm Warning** is issued when ice accumulations of $\frac{1}{4}$ inch or more are expected.

- **Not Issued for a mixture of snow/sleet/ice**

A **Freezing Rain Advisory** is issued when freezing rain will cause a significant inconvenience, but not serious enough for a warning.

- **Not Issued for a mixture of snow/sleet/ice**

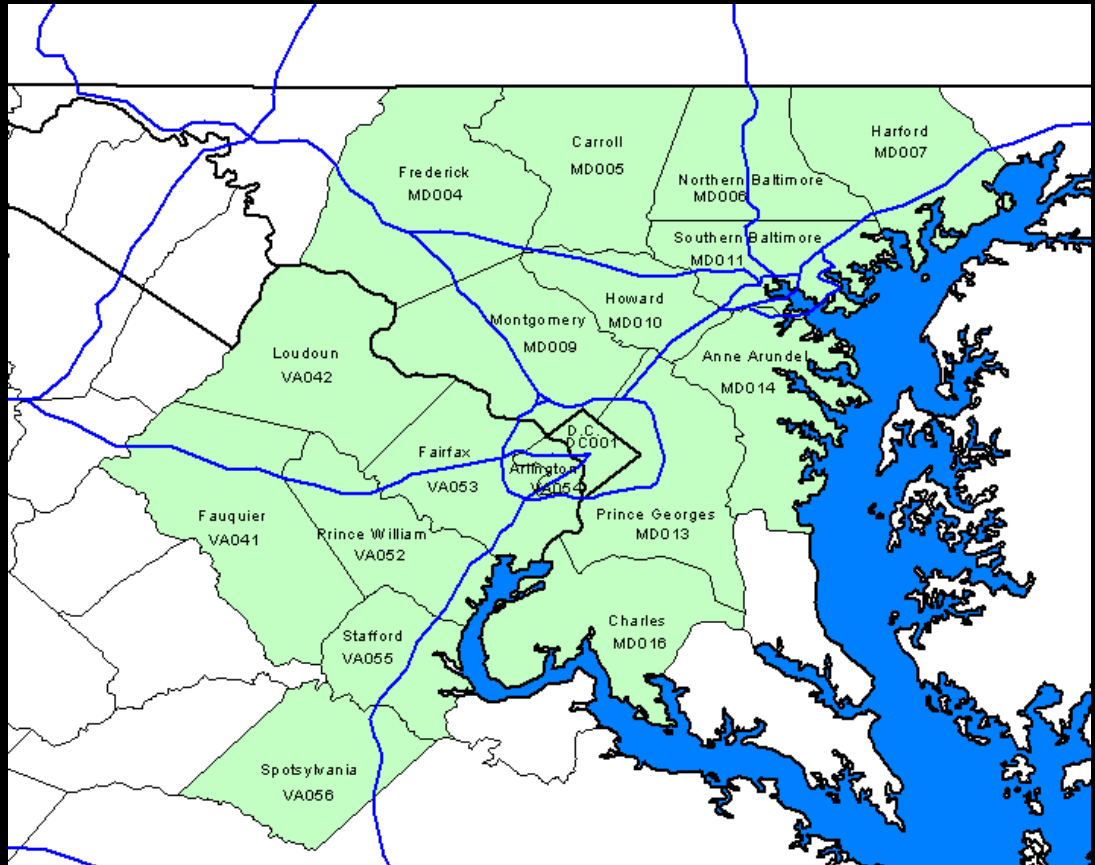
A **Blizzard Warning** is issued when the following conditions will be met for three hours or more:

- Considerable falling and/or blowing snow will reduce visibilities to less than $\frac{1}{4}$ mile
- AND sustained winds/frequent gusts of 35 mph or higher

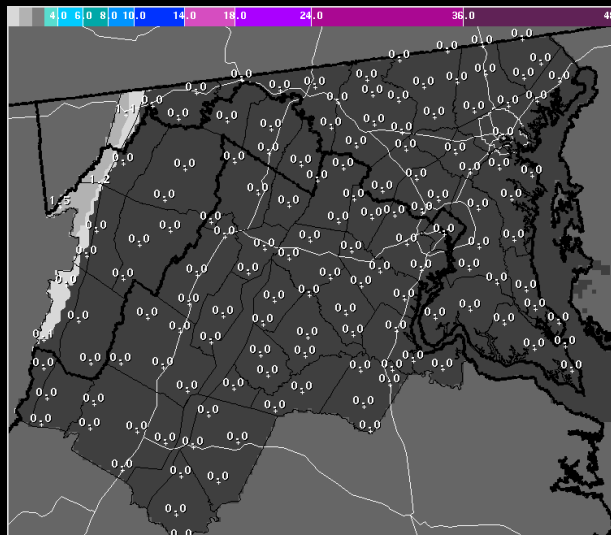
Just a Few More Notes on Advisories...

Advisories can be issued for sub-criteria events in the following cases:

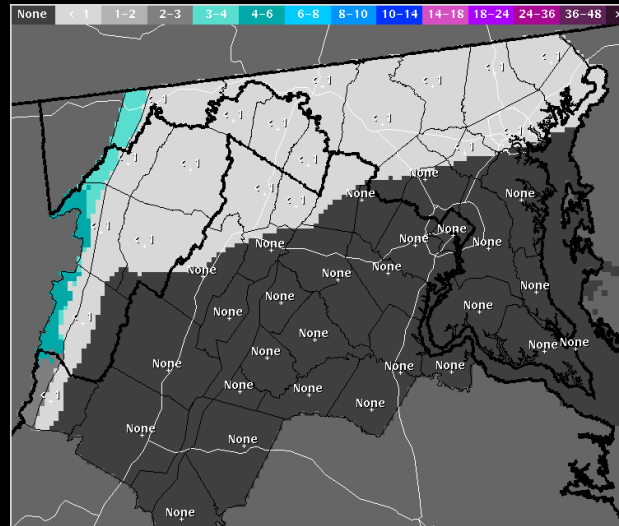
- **First snowfall of the season**
- **If snow showers/squalls will produce locally heavy snowfall**
- **If one inch of snow is expected to impact the Baltimore/Washington Metro Areas during Rush Hour (4-9AM & 2-7PM)**



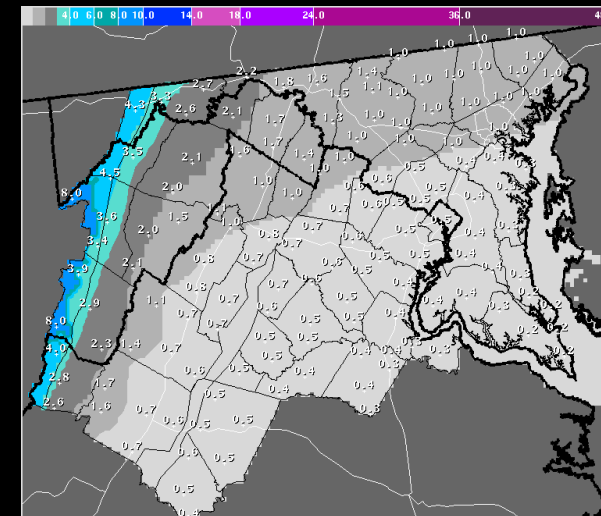
Winter Probabilistic Graphics



Minimum – Expect at least this much

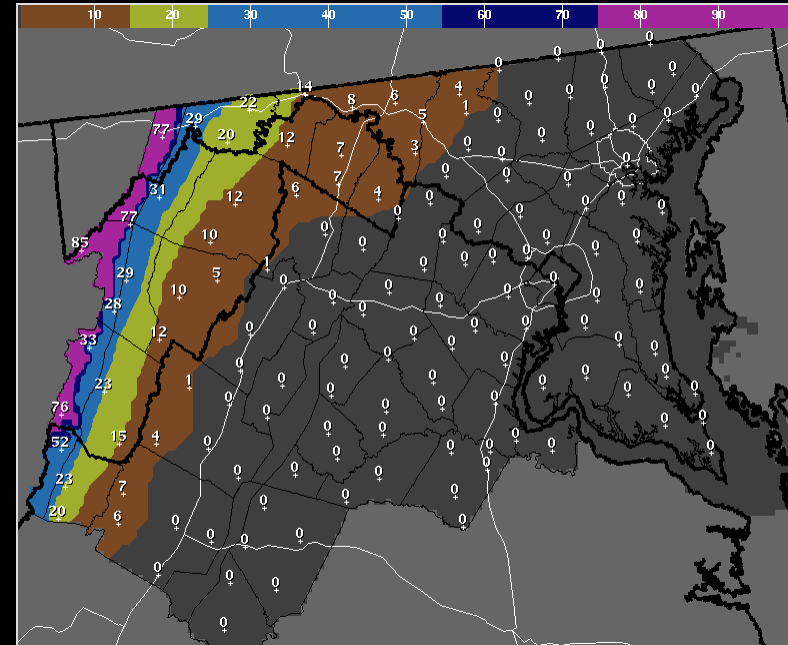
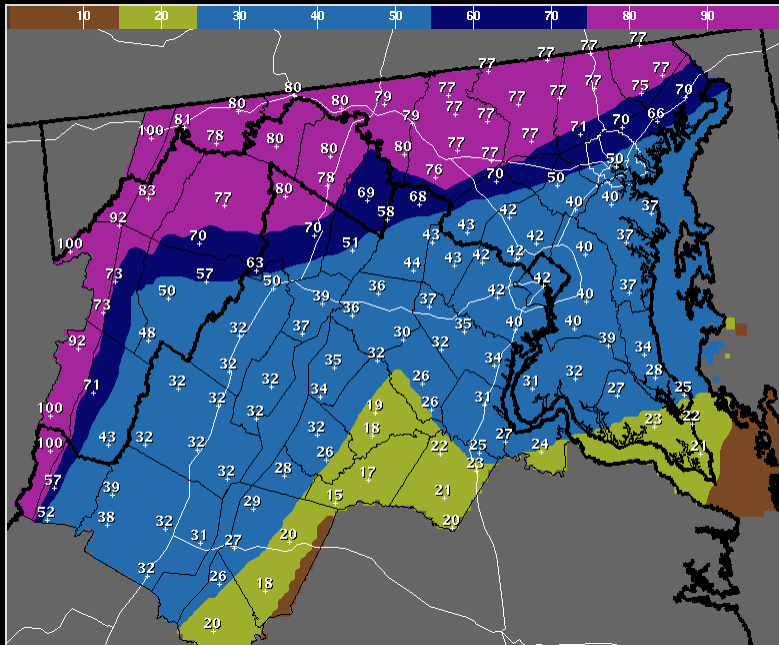


Most Likely Forecast



Maximum – Potential for this much

Winter Probabilistic Graphics

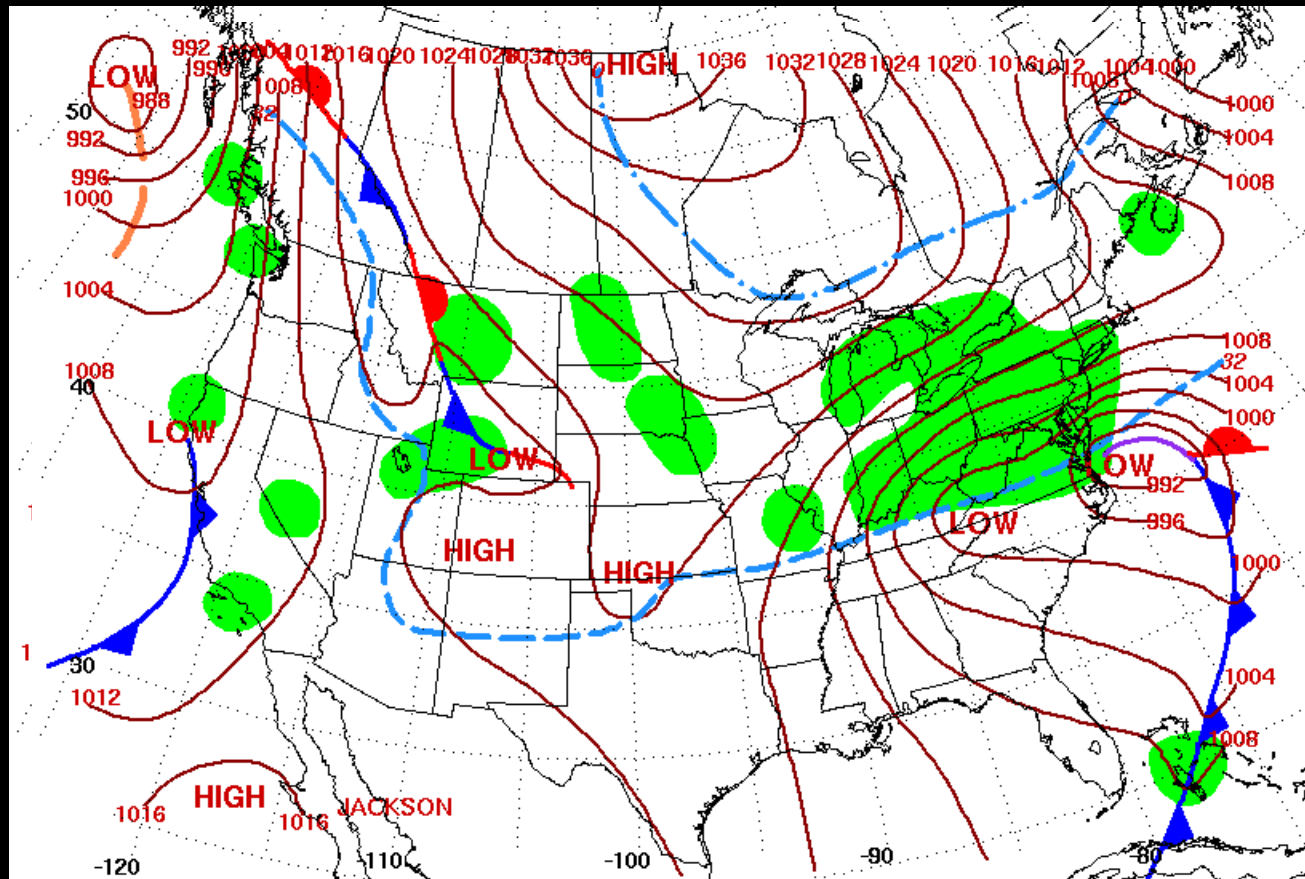


Chance that Snow Accumulations Will Be Greater Than...

- Trace, 1, 2, 4, 8, 12, 18 inches

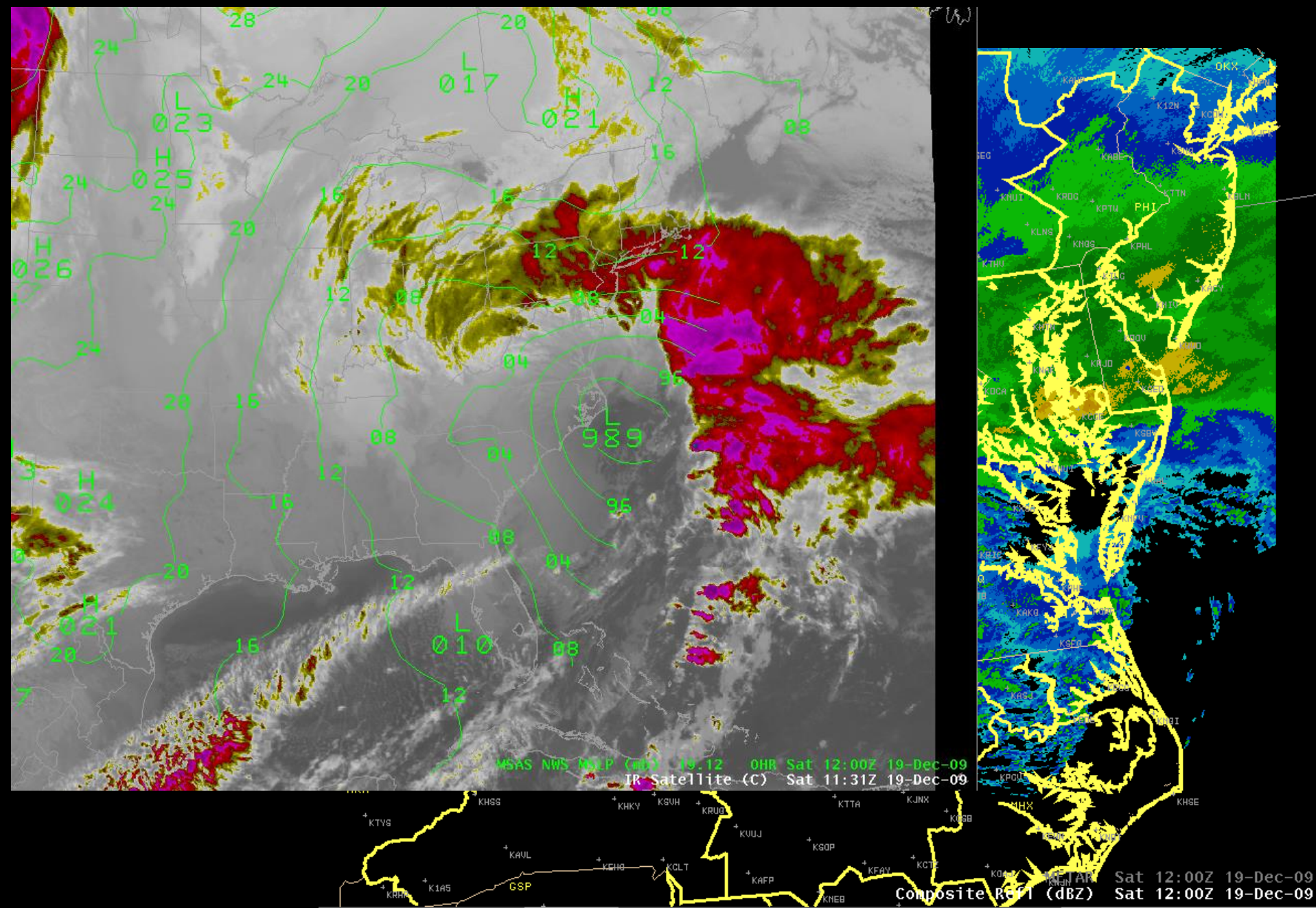
December 18-19, 2009

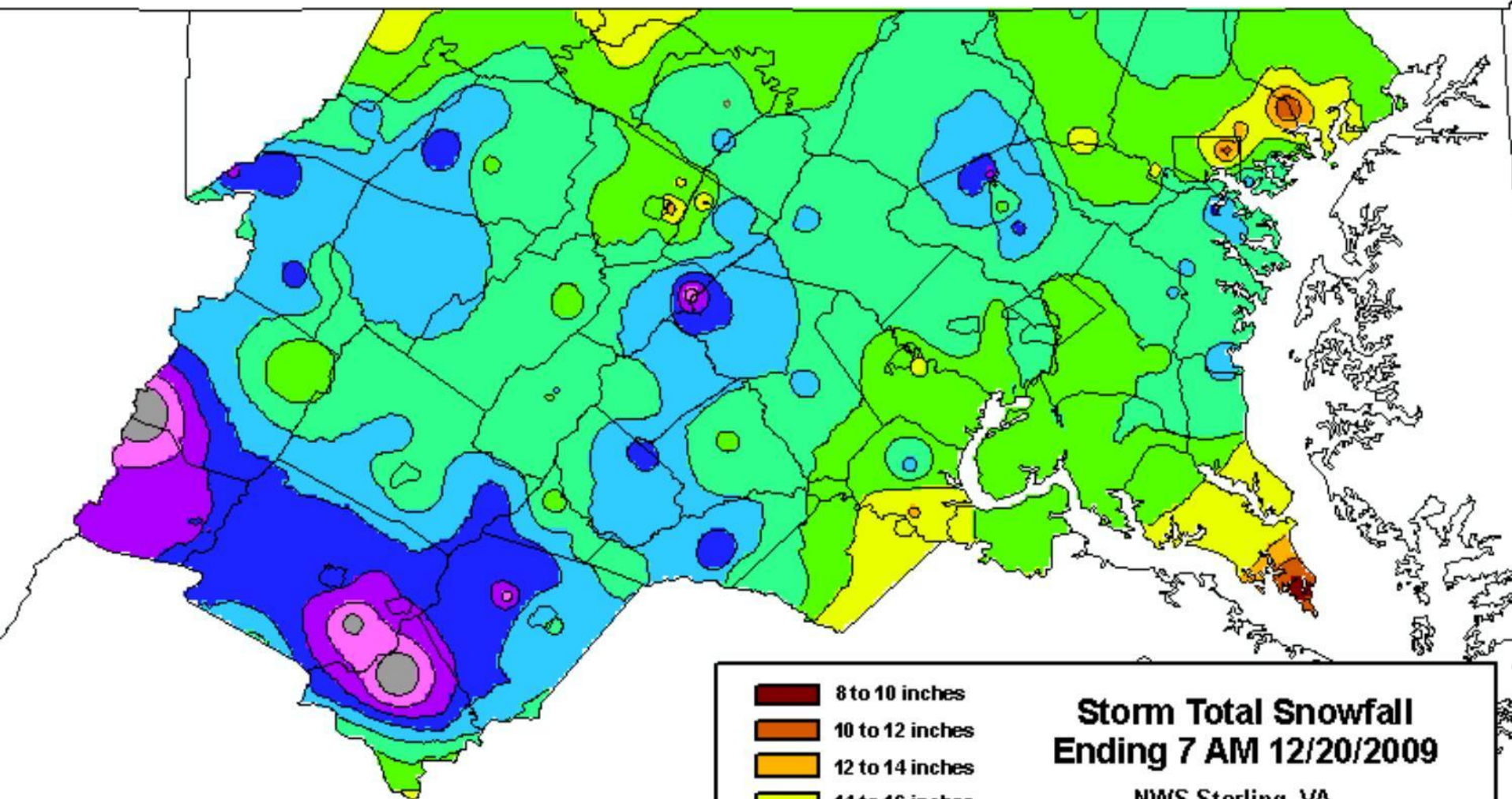
- Low pressure system brought abundant moisture from the Gulf of Mexico and the Atlantic Ocean
- Low pressure tracked across the SE US and moved up the Mid Atlantic coast
- The low center intensified rapidly off the Mid Atlantic Coast
- High pressure entrenched to the north/Cold air in place
- The storm system slowed down on Saturday, with heavy snow
- Temperatures in the Upper 20s/Lower 30s on the evening of the 18th developing across the Mid Atlantic



12Z Satellite & Radar Presentations

12Z Satellite & Radar Presentations





**Storm Total Snowfall
Ending 7 AM 12/20/2009**

NWS Sterling, VA



December 18-19, 2009



Photo By: thestar.com



Photo By: Parish Universalist Church of Arlington



Photo By: Newscom

Snowmelt from this storm caused flooding on the 25th & 26th of December.

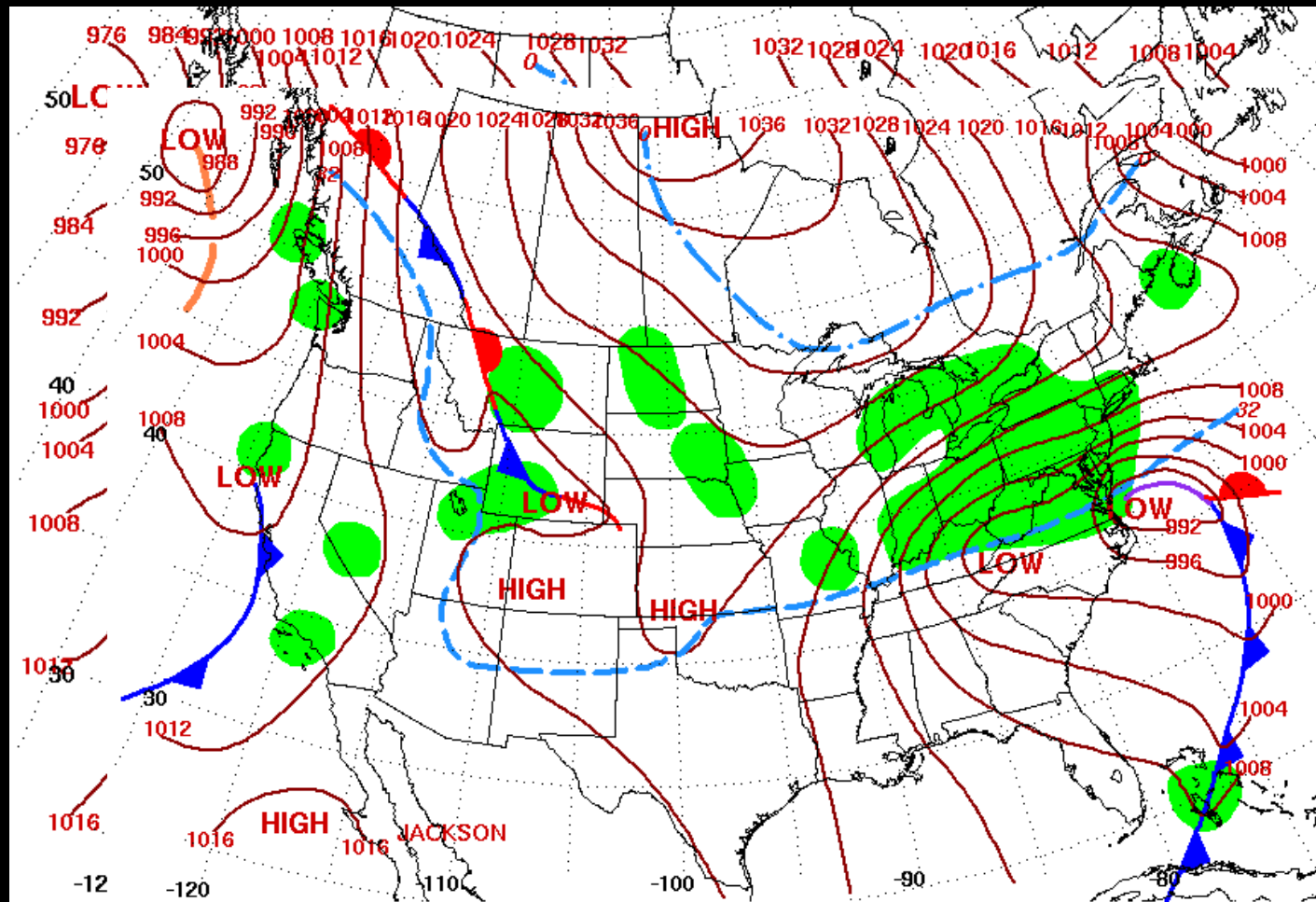


Photo By: WTOP

February 5-6, 2010

- Low pressure developed over the Gulf States and moved NE up the Mid Atlantic Coast
- Abundant moisture supplied by the Gulf of Mexico and the Atlantic Ocean
- Heavy wet snow fell
- High pressure entrenched to the north
- Cold air in place

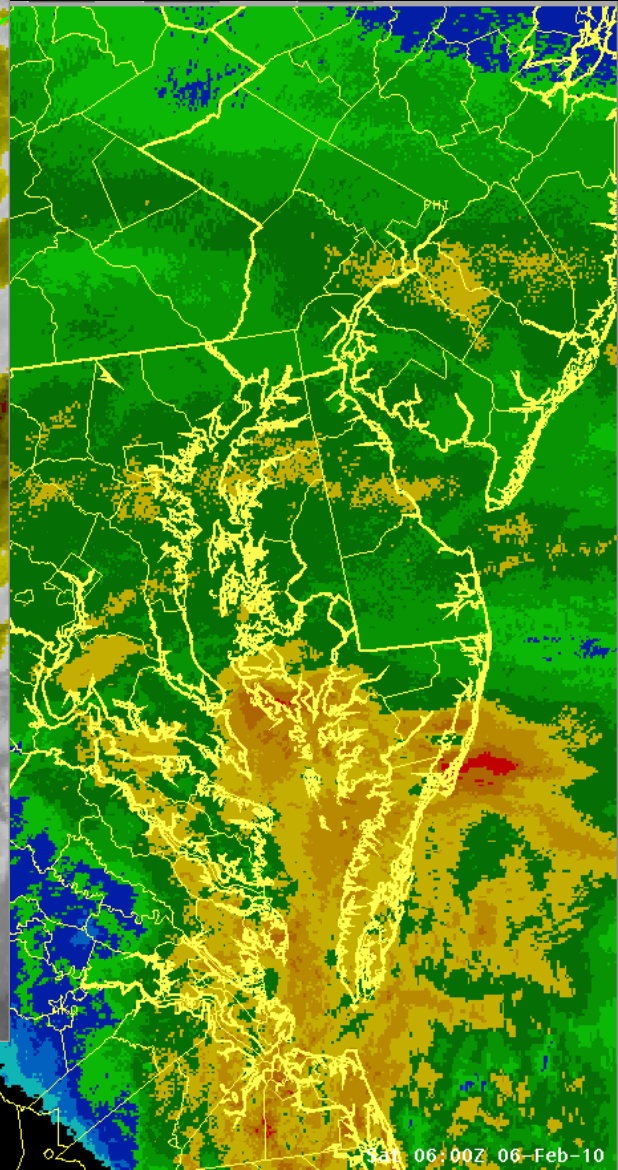
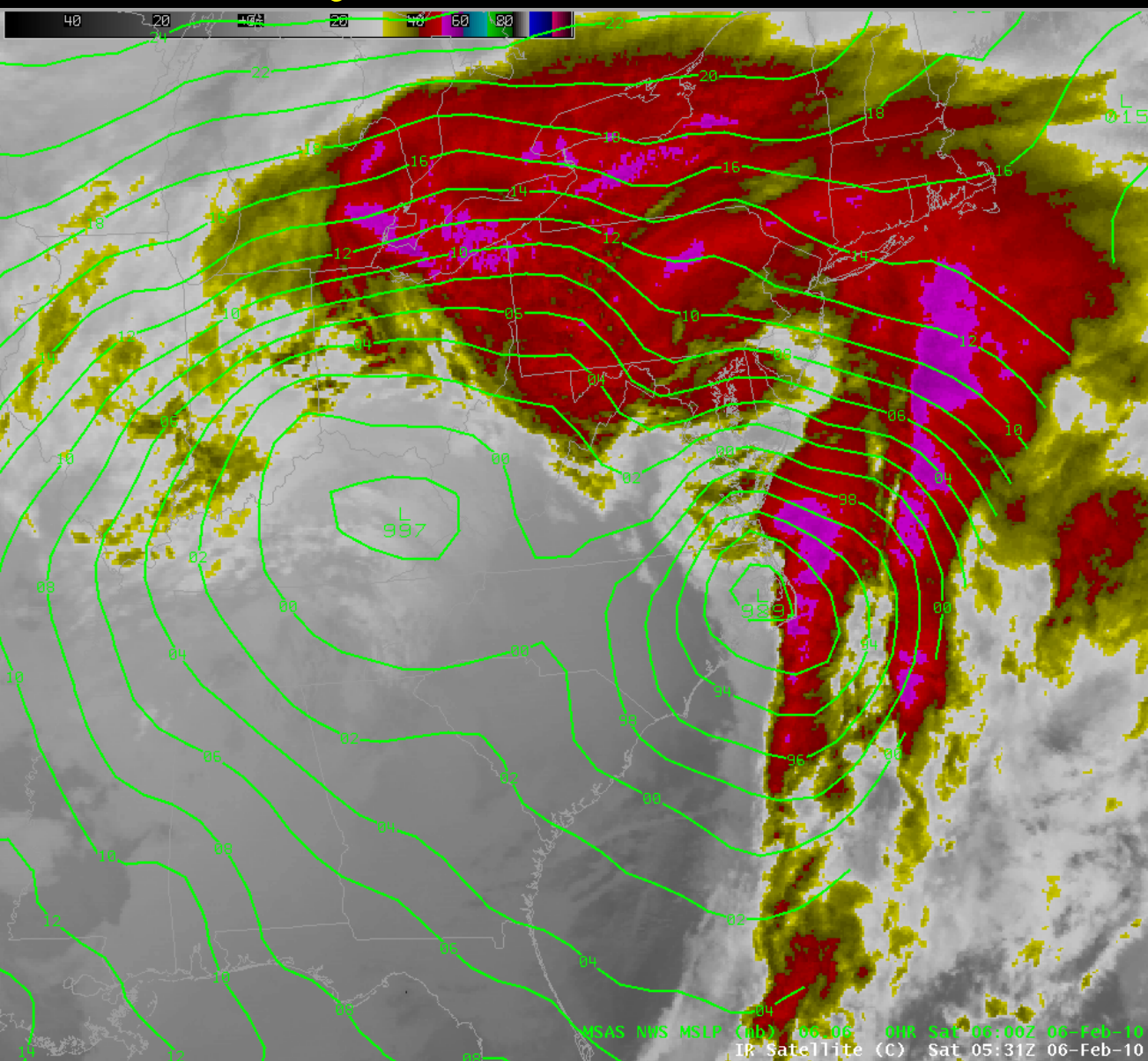
Sound Familiar????

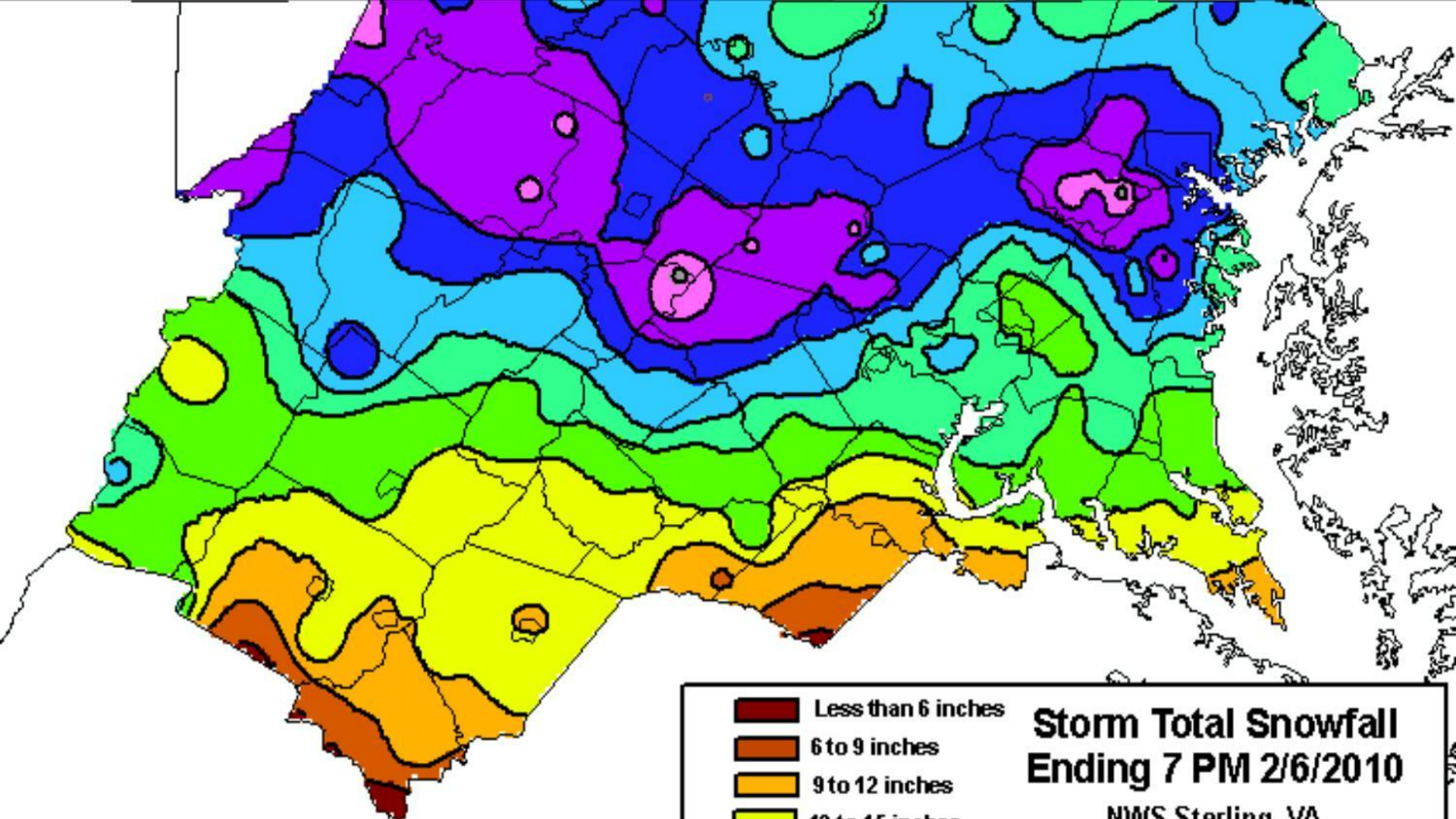


Surface Weather Map at 7:00 A.M. E.S.T.

February 5-6, 2010

06Z Satellite & Radar Presentations

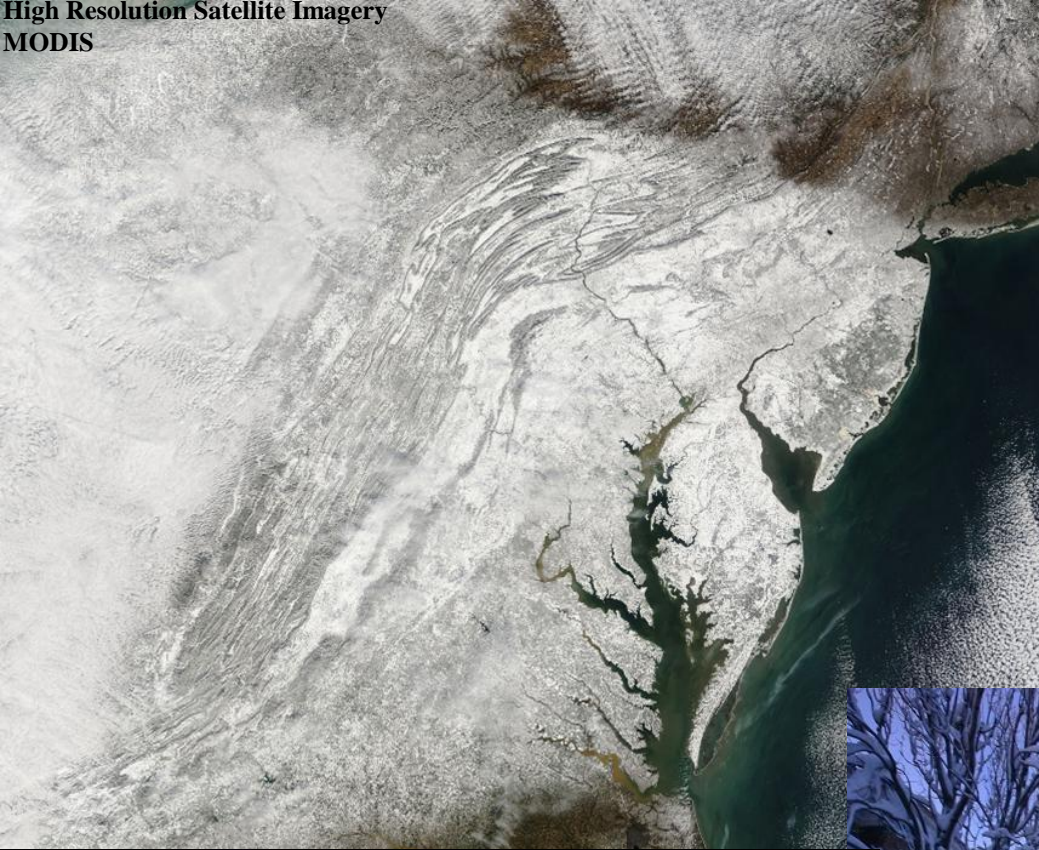




**Storm Total Snowfall
Ending 7 PM 2/6/2010**

NWS Sterling, VA





Winchester, Virginia
Photo By: Michael Rutkaus



Federal Hill in Baltimore (Flickr)



Street in Baltimore
Photo By: Shawn Bennaman (Flickr)

Other Notable Winter Storms February 10, 2010

900 AM EST WED FEB 10 2010

Note: "FAIR" indicates few or no clouds below 12,000 feet with no significant weather and/or obstructions to visibility.

* =Non NWS site. Station does not report significant weather and/or obstructions to visibility.

...DOWNTOWN AREAS...

CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
WASHINGTON NAT	HVY SNOW	24	19	81	NW22G32	29.42R	VSB 1/4 WCI 9
MD SCIENCE CTR	N/A	31	28	89	MISG	29.32F	

...WASHINGTON SUBURBS...

CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
DULLES	HVY SNOW	22	17	81	NW24G43	29.42F	VSB 1/8 WCI 5
MANASSAS*	CLOUDY	25	18	74	NW18G25	29.45S	WCI 11
LEESBURG*	CLOUDY	23	19	86	W26G39	29.41F	WCI 6
GAITHERSBURG*	CLOUDY	23	19	86	NW21G32	29.40S	VSB 1/4 WCI 8
FT BELVOIR	LGT SNOW	25	19	80	W18G37	29.41S	VSB 3/4 WCI 11
QUANTICO	LGT SNOW	25	20	81	NW20G26	29.44S	VSB 3/4 WCI 11
ANDREWS AFB	MIX PCPN	24	22	96	NW17	29.37S	VSB 1/4 WCI 10

...CENTRAL VIRGINIA...

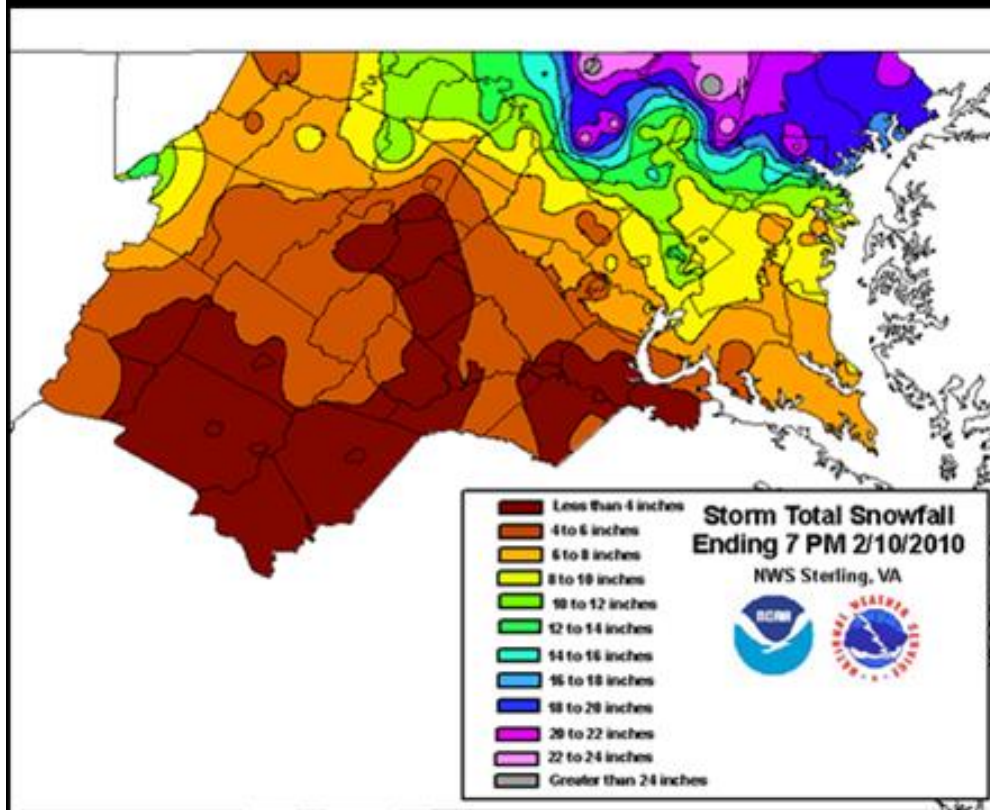
CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
CULPEPER*	LGT SNOW	25	19	80	W18G28	29.46S	WCI 11
CHARLOTTESVILL	CLOUDY	22	13	68	W16G29	29.48S	WCI 8
WARRENTON*	LGT SNOW	25	21	86	NW13	29.44F	WCI 13
ORANGE*	LGT SNOW	25	23	93	SW12G18	29.48F	WCI 14
LOUISA*	LGT SNOW	25	N/A	N/A	W15G21	29.46S	WCI 12
RICHMOND	HVY SNOW	26	22	84	NW17G33	29.46R	VSB 1/4 WCI 13

...NORTHEAST/CENTRAL MARYLAND...

CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
BWI AIRPORT	SNOW	29	27	92	NW16G31	29.32F	VSB 1/4 WCI 17
ANNAPOLIS	SNOW	30	27	86	NW17G24	29.31F	VSB 1/4 WCI 18
MARTIN AIRPORT	HVY SNOW	30	30	100	NW16G23	29.32F	VSB 1/4 WCI 19
WESTMINSTER*	SNOW	28	25	86	NW13G21	29.36F	VSB 1/4 WCI 18
FREDERICK*	SNOW	25	23	93	CALM	29.47R	VSB 1/4
FORT MEADE*	CLOUDY	28	28	100	NW12G25	29.37S	VSB 1/4 WCI 18

...SOUTHERN MARYLAND...

CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
PATUXENT RIVER	SNOW	28	27	93	W36G48	29.33S	VSB 1/4 WCI 12
ST MARYS CITY	LGT SNOW	34	28	80	W16G24	29.34R	VSB 3/4 WCI 23
LEONARDTOWN*	CLOUDY	30	30	100	NW9G22	29.35S	VSB 3/4 WCI 22



- Blizzard Conditions
- Up to 26 inches in Westminister, MD

Other Notable Winter Storms

Knickerbocker Storm

January 27-28, 1922

- 28 Inches of Snow in Washington, DC
- 27 Inches of Snow in Baltimore
- 30-32 Inches of Snow across Howard & Prince Georges Counties
- Gusts to 50 MPH causing blizzard conditions
- Roof Collapsed on Knickerbocker Theater (Washington DC)
 - 98 Died
 - Hundreds Injured

Images Courtesy: Washington Post



Reporting Criteria for Winter Storms



- **Ice Accumulation** Any glaze on surfaces

- **Snow Accumulation** Every 2 inches, or any accumulation not reflected in the forecast



Severe Weather Reporting Criteria

- **Tornado or Funnel**
(Please be clear on this!).
- **Hail:** Pea sized or larger.
- **Rotation** within a storm.



- **Wind:** 50 MPH or greater (Indicate gust or sustained, measured or estimated.)
- **Damage:** Any weather related damage to trees or property. Give as many details as possible.



- **Heavy Rain:** Measured 1 inch or more
- **Flooding:** Streams, creeks or rivers out of banks or flooding of roads from poor drainage



**We are grateful to have you as a
member of our team!**



Thank You



Any Questions or Comments?

Christopher.Strong@noaa.gov

Warning Coordination Meteorologist

or

Ashley.Sears@noaa.gov

General Forecaster/Skywarn Coordinator